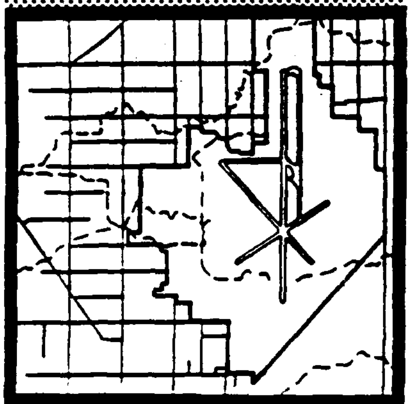

INSTALLATION RESTORATION PROGRAM (IRP)

Operable Unit B1 Interim Record of Decision (ROD)

for McCLELLAN AFB, CALIFORNIA

FINAL

JULY 1993

McCLELLAN AFB / EM
McCLELLAN AFB, CALIFORNIA 95652-5990

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INSTALLATION RESTORATION PROGRAM (IRP)

OPERABLE UNIT B1
INTERIM RECORD OF DECISION

FINAL

FOR

McCLELLAN AFB/EM
McCLELLAN AFB, CALIFORNIA 95652-5990

July 1993

USAF CONTRACT NO. F04699-93-C0027
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13. ABSTRACT (Maximum 200 words)

This ROD presents the selected remedial action for Operable Unit (OU) B1 at McClellan AFB, Sacramento, CA. Operable Unit B1 includes the Defense Reutilization and Marketing Office (DRMO) storage lot and Civil Engineering storage lot at McClellan AFB. The main chemicals of concern are PCBs, dioxins, and furans which may have leaked from transformers stored at OU B1 or were constituents of waste oil applied to soils to control dust.

Part I outlines the purpose of the ROD and the selected remedy. Part II Sections 1.0 and 2.0 describe the site and Section 3.0 provides highlights of community participation. Part II Sections 4.0 and 5.0 present results from the RI, the potential for contaminant migration/transport from OU B1, and the current and future risks associated with OU B1. Section 6.0 identifies the remedial action objectives and potential remedial alternatives. The final seven remedial alternatives are analyzed and compared to each other using the criteria established in the National Contingency Plan in Section 7.0. The selected remedy is presented in Section 8.0.

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This report has been prepared by the staff of Radian Corporation under our supervision. The presentation of information contained herein has been approved after thorough technical review. The conclusions and recommendations in this report are based upon the data collected in the field by Radian Corporation. We believe the data presented are of high quality. The interpretation of these data and the conclusions drawn were governed by our experience and professional judgement.

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ACRONYM LIST

AFB	=	Air Force Base
AR	=	Administrative Record
ARARs	=	Applicable or Relevant and Appropriate Requirements
ATSDR	=	Agency for Toxic Substances and Disease Registry
BGS	=	Below ground surface
C	=	Degrees Celsius
Cal/EPA	=	California Environmental Protection Agency
CCR	=	California Code of Regulation
CE	=	Civil Engineering
CERCLA	=	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	=	Code of Federal Regulations
COC	=	Contaminant of concern
CRP	=	Community Relations Plan
DCE	=	Dichloroethene
DOT	=	Department of Transportation
DRMO	=	Defense Reutilization and Marketing Office
DTSC	=	Department of Toxic Substances Control
EPA	=	Environmental Protection Agency
FS	=	Feasibility Study
g/L	=	Gram per liter
H	=	Henry's Law constant
HDPE	=	High density polyethylene
HI	=	Hazard index
HQ	=	Hazard quotient
HVOC	=	Halogenated Volatile Organic Compound
IRP	=	Installation Restoration Program
ISWP	=	Inlands Surface Work Plan
I-TEF	=	International Toxic Equivalency Factor
IAG	=	Interagency Agreement
m/s	=	Meters per second
mg/kg	=	Milligram per kilogram
NCP	=	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	=	National Pollution Discharge Elimination System

ACRONYM LIST (Continued)

OU	=	Operable Unit
PCB	=	Polychlorinated biphenyl
PCE	=	Tetrachloroethene
PeCDD	=	Pentachlorodibenzodioxin
PeCDF	=	Pentachlorodibenzofuran
pg/L	=	Picograms per liter
ppbv	=	Parts per billion by volume
PRL	=	Potential Release Location
PSP	=	Perforated steel planking
RCRA	=	Resource Conservation and Recovery Act
RD/RA	=	Remedial Design/Remedial Action
RfD	=	Reference dose
RI	=	Remedial Investigation
RME	=	Reasonable maximum exposure
ROD	=	Record of Decision
RWQCB	=	Regional Water Quality Control Board
SA	=	Study Area
SARA	=	Superfund Amendments and Reauthorization Act
SMAQMD	=	Sacramento Metropolitan Air Quality Management District
SVOC	=	Semivolatile organic compound
SWRCB	=	State Water Resources Control Board
TBC	=	To be considered; guidance or criteria not promulgated (and therefore not an ARAR) that is nonetheless "to be considered" in developing remediation goals
TCDD	=	Tetrachlorodibenzodioxin congeners
TCDDeq	=	TCDD equivalents
TCE	=	Trichloroethene
TRC	=	Technical Review Committee
TSCA	=	Toxic Substances Control Act
U.S. EPA	=	U.S. Environmental Protection Agency
VOC	=	Volatile organic compound
µg/L	=	Microgram per liter
µg/kg	=	Microgram per kilogram

PART I. DECLARATION

1.0 SITE NAME AND LOCATION

McClellan Air Force Base (AFB)
Operable Unit (OU) B1
McClellan AFB, California

U.S. EPA ID# CA4570024337

2.0 STATEMENT OF BASIS AND PURPOSE

This Interim Record of Decision (ROD) presents the selected interim remedial action for OU B1 at the McClellan AFB Superfund site. The interim action was selected to protect human health from an imminent threat in the short-term and to prevent further migration of contamination while a final remedial solution is being developed.

This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. § 9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR § 300 et seq. The attached administrative record index (Attachment B) identifies the documents upon which the selection of the remedial action is based.

The U.S. Environmental Protection Agency and the State of California, through the Division of Toxic Substances Control (DTSC) and California Regional Water Quality Control Board (RWQCB), concur with the selected remedy.

3.0 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Interim ROD, may present an imminent and substantial endangerment to public health, welfare, or to the environment.

4.0 DESCRIPTION OF THE REMEDY

Alternative 6, the selected remedy, which addresses the primary risks posed by soil contamination (a principal threat at this site) consists of the following components:

(1) The site will be capped using a minimum two-inch thick asphaltic concrete cover, eliminating any immediate threat by minimizing transport via surface water runoff and preventing ingestion, dermal exposure, and inhalation of contaminated dust.

(2) Any sediments in the ditches leading off the site determined to contain contaminants that pose health or ecologic risks or are above five times sediment background concentrations will be excavated and placed under the cap. An asphaltic or Gunite® cap will be placed over any remaining contaminated sediments in the ditches. Contaminated soils will also be consolidated at OU B1 from the nearby sites Potential Release Location (PRL) 29, Study Area (SA) 12, and SA 4.

(3) The cap will substantially reduce driving forces for migration of contaminants to groundwater, effectively eliminating that exposure pathway.

(4) The cap will be monitored and periodically repaired to maintain long-term effectiveness, in compliance with an approved cap operations and maintenance program document.

(5) Surface water, vadose zone soils, soil gas, and groundwater will be monitored under an approved program to assure long-term cap integrity and effectiveness.

(6) Soil treatment technologies that offer the potential of reducing toxicity of contaminants will continue to be evaluated; technologies tested will adhere to specific performance criteria defined by reduction of potential health risk. An annual report of progress will be prepared.

(7) Prior to selection of a final remedy, institutional controls, in the form of deed restrictions, will be invoked to ensure that the area of OU B1 will be used only for industrial activities.

The selected alternative is consistent with the criteria of interim remedial actions and with the basewide remediation strategy developed for McClellan AFB. The alternative will protect employees and site visitors from health risks and prevent further migration of contamination while a final remedial solution is developed. Therefore, the alternative meets the criteria for interim actions. The McClellan AFB remediation strategy calls for 1) short-term actions that will successfully reduce significant threats to health and to the environment, and 2) continuing development of cost-effective technologies to reduce contaminant toxicity, mobility, and volume as final remedial solutions.

5.0 STATUTORY DETERMINATIONS

5.1 Protectiveness

The selected remedy is protective of human health and the environment. Protection will be achieved at this site by capping contaminated soils, thereby eliminating any immediate threat by preventing ingestion, dermal exposure, and inhalation of contaminants in soils, sediments, or surface water. Institutional controls will be used to ensure only industrial use for the capped area, while a final remedy is being developed. Groundwater resources are also protected by this remedy.

5.2 Applicable or Relevant and Appropriate Requirements

The selected response actions comply with federal and state requirements that are legally applicable, or relevant and appropriate.

5.3 Reduction of Toxicity, Mobility or Volume Through Treatment

Soil containing greater than 10 parts per million (ppm) of polychlorinated biphenyl (PCB) compounds will be capped, thereby reducing the mobility of site contamination; toxicity and volume of contamination will not be reduced until a soil treatment technology is selected and implemented. Soil containing less than 10 ppm will also be capped. This more extensive cap construction is planned to improve the Defense Reutilization Marketing Office (DRMO) yard for greater traffic loads, as opposed to meeting a CERCLA cleanup level.

Treatment technologies for soil will continue to be evaluated. The signers' of this agreement commitment demonstrates their intent to satisfy the preference to reduce contaminant toxicity, mobility, or volume as a principal element.

5.4 Use of Permanent Solutions, Alternative Treatment or Resource Recovery Technologies

Permanent solutions and alternative treatment or resource recovery technologies will be used to the maximum extent practicable in the selection and implementation of a final soil treatment technology for OU B1. During evaluation, treatability study update reports will annually assess the status of viable treatment technologies.

Because the capping remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after initiation of the remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

5.5 Cost Effectiveness

The remedy is cost effective because maximum protection is achieved for the estimated cost of performance. The analysis contained in the Feasibility Study and this ROD demonstrates that additional remedial action and the cost associated with that action would not achieve a measurable reduction in risk, but that less effort and a lower cost would result in a measurably higher risk at the site.

______________________________ Date

______________________________ Date

John Wise
Acting Regional Administrator
U.S. Environmental Protection Agency
Region IX

______________________________ Date

Anthony J. Landis, Chief
Site Mitigation Branch
Department of Toxic Substances Control
Region 1

PART II. DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the McClellan Air Force Base (AFB) Operable Unit (OU) B1 Superfund site. It also includes a description of the remedial alternatives considered, and the analysis of those alternatives compared to criteria set forth in the National Contingency Plan (NCP). This Decision Summary explains the rationale for the remedy selection and how the selected remedy satisfies the statutory requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 Site Name and Location

McClellan AFB
OU B1
McClellan AFB, California

1.2 Site Description

Operable Unit B1 is located in the southwest portion of McClellan AFB. The OU consists of an open storage lot operated by the Defense Reutilization and Marketing Office (DRMO), a former transformer storage, loading, and unloading area, and the Civil Engineering (CE) Storage Yard, and three drainage ditches that receive surface water runoff from the DRMO storage lot. The OU is approximately 18 acres in size.

The area of OU B1 is relatively flat and underlain by alluvial soils. Three ditches drain OU B1: two in the northern areas and one in the southern area.

1.3 Topography

The McClellan AFB facility is located in the Sacramento Valley, approximately seven miles northeast of Sacramento, California. The regional topography slopes gently westward toward the Sacramento River.

1.4 Land Use

The on-base areas surrounding OU B1 are industrial, warehouse, and aircraft operation areas. Off-base (within 500 feet), nearby land is zoned residential and light industrial.

1.5 Location and Facility Layout

Figure 1-1 shows the location of the site near Sacramento. Figure 1-2 shows the current site features within the OU. The area delineated as OU B1 consists of four previously identified sites and the area between them: Potential Release Location (PRL) 29, Study Area (SA) 12A, SA 12B, and SA 13. Operable Unit B1 also includes the drainage ditches that receive runoff from the DRMO storage yard. Throughout this document these locations will be referred to collectively as OU B1.

1.6 Geology

The subsurface in the area of OU B1 consists of alluvial sands, silts with minor gravel, and clay layers.

From the ground surface to the top of the water table (105 feet below ground surface [BGS]), vadose zone deposits beneath OU B1 consist of inter-bedded sands, silt, and thin clay lenses, with a hardpan layer between 3 and 8 feet BGS. These sediments were deposited in a complex fluvial environment of frequently shifting streams on an alluvial plain that resulted in laterally and vertically discontinuous lithologic units. Iron-oxide cemented hardpan layers indicate periods of nondeposition. Silt layers have carbon-coated root casts and organic debris from plant growth, which also indicate periods of nondeposition. Carbonaceous material was reported in borings from 2 to 40 feet BGS.

The water table beneath McClellan AFB is typically 100 to 105 feet BGS and varies locally because of topography and depressions created by water supply wells. From the water table to a depth of greater than 400 feet BGS, one aquifer provides water for domestic and industrial uses in the vicinity of McClellan AFB. Beneath OU B1, groundwater flows to the southeast toward a pumping depression created by McClellan AFB and municipal supply wells.

The communities in the vicinity of McClellan AFB receive potable water from off-base municipal wells; McClellan AFB obtains potable water from on-base wells. The nearest well to OU B1 is Base Well 18, located approximately 1,000 feet southeast of OU B1.

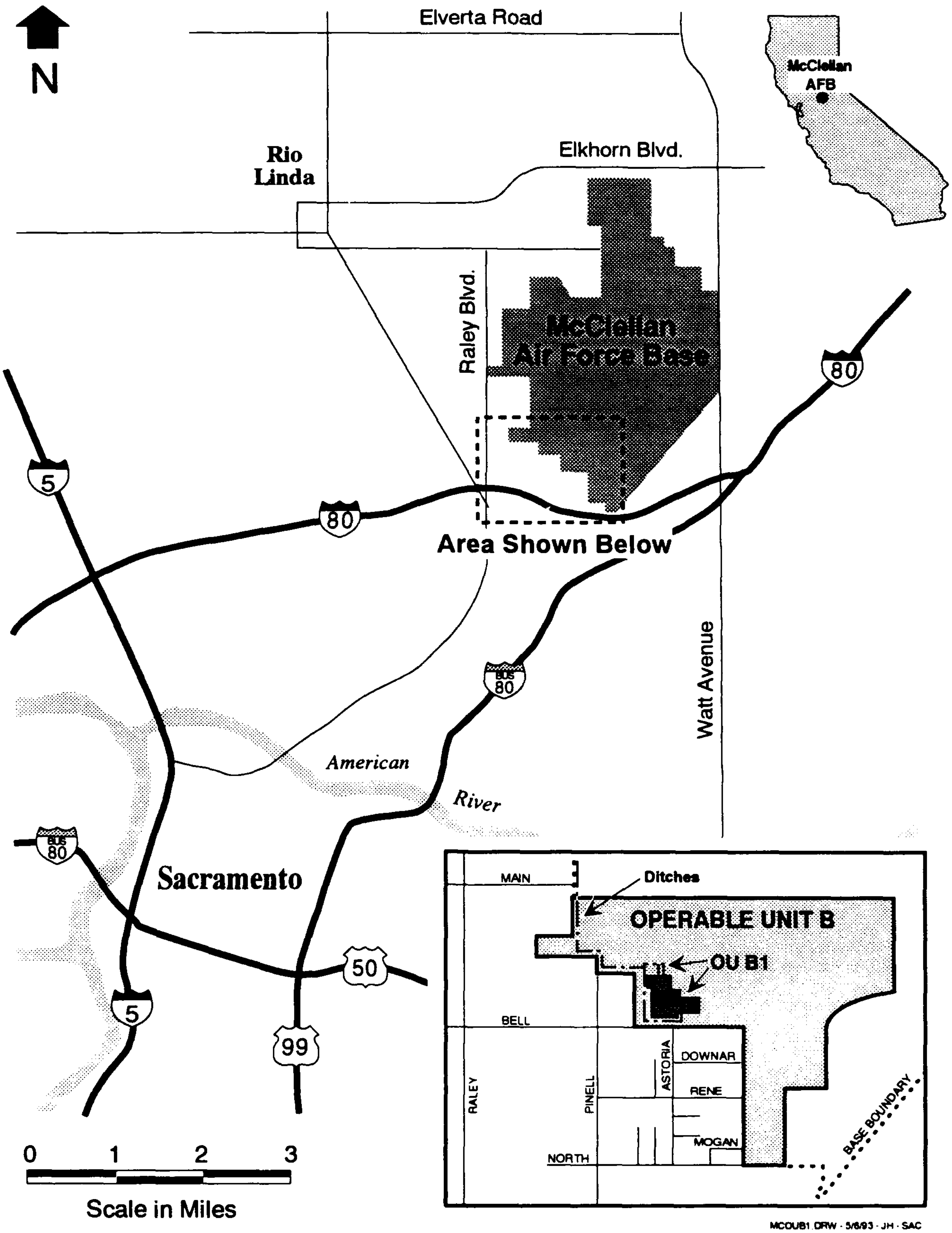

Figure 1-1. Location of Operable Unit B1 at McClellan Air Force Base

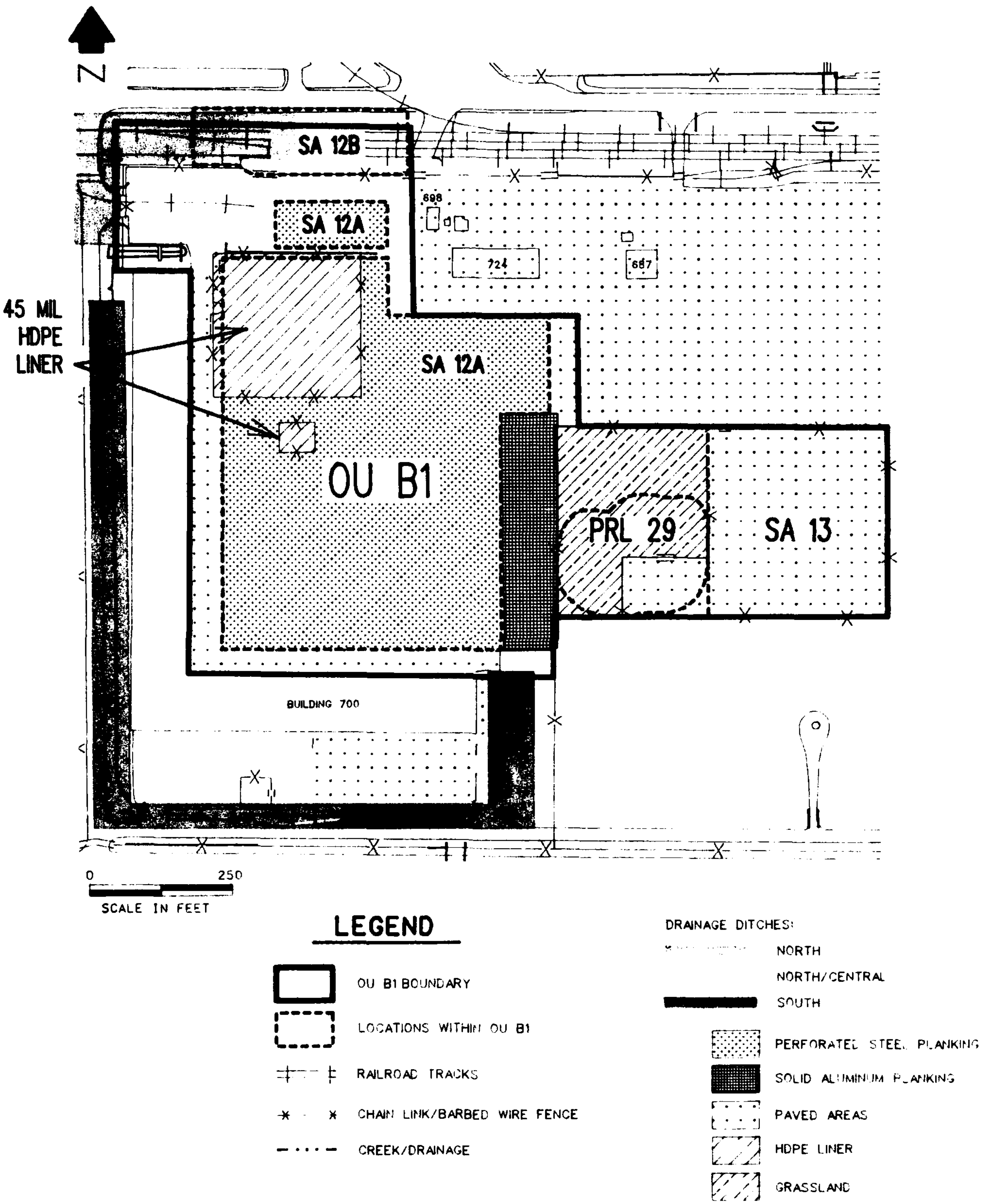

Figure 1-2. Locations Within OU B1

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Background on Contamination Problems at McClellan AFB OU B1

The area designated as OU B1 was open farm land and residences until about 1957. A chronological history of the area is shown in Figure 2-1. Building 700, which borders OU B1 on the south and west, was built in approximately 1962; the area northeast of the building has been used as an open storage lot by the DRMO since the early 1960s.

In the early 1960s, waste oil was applied to OU B1 soils to suppress dust. The waste oil was collected from various facilities on base. The oil may have consisted of hydraulic oils, degreasing solvents, transformer oils, and automotive oils and fluids. Transformers were stored at the DRMO lot at various times from the 1960s through 1987.

North of the storage lot along the railroad tracks, transformers containing oil with PCBs were loaded and unloaded from railroad cars (SA 12B). The CE storage yard (SA 13) has also been in use since the 1960s. Most of the materials stored at the yard were nonhazardous; however, transformers containing PCBs were reportedly stored in the yard some time between 1960 and 1987. By 1977, the CE yard was paved with asphalt.

In 1987, 1.5 to 7 gallons of PCB-contaminated oil leaked from a transformer onto the ground in the northern portion of the DRMO storage lot. Contaminated soil in the area was excavated to approximately 10 inches, removed, and covered with clean gravel (Radian, 1991).

In 1992, during the OU B RI, PCB contamination was reported in surface soil in the DRMO yard. A fence was constructed around the soil area containing at least 100 milligrams per kilogram (mg/kg) of PCBs to restrict access, and solid metal planking was placed over the area to reduce fugitive dust emissions (Radian, 1993). In 1993, a 45-mil HDPE plastic liner was placed over the area to control dust and to prevent runoff to a nearby drainage ditch. The fence and liner constituted a time-critical removal action to prevent worker exposure and transport of PCBs and dioxins in runoff. Access to the DRMO yard was also restricted so that only adults could enter.

2.2 Previous Studies

Previous studies at OU B1 include: a 1985 investigation to determine the presence or absence of buried waste at PRL 29, a 1987 investigation to verify cleanup of an oil spill, a 1990 shallow soil gas investigation, and the 1991-1992 OU B RI. Objectives of the OU B RI were to determine the presence or absence of PCBs and other contaminants, to define possible contaminant source areas, and to collect sufficient data to conduct a health risk assessment and an engineering evaluation of remedial alternatives.

In a sampling effort subsequent to the OU B RI, sediment sampling was performed in drainage ditches receiving runoff from the DRMO storage yard. The OU B1 Remedial Investigation/Feasibility Study (RI/FS) Report (Radian, 1993) documents the distribution of chemicals of concern and evaluates technologies that could be applied to remediate contaminated soils at OU B1.

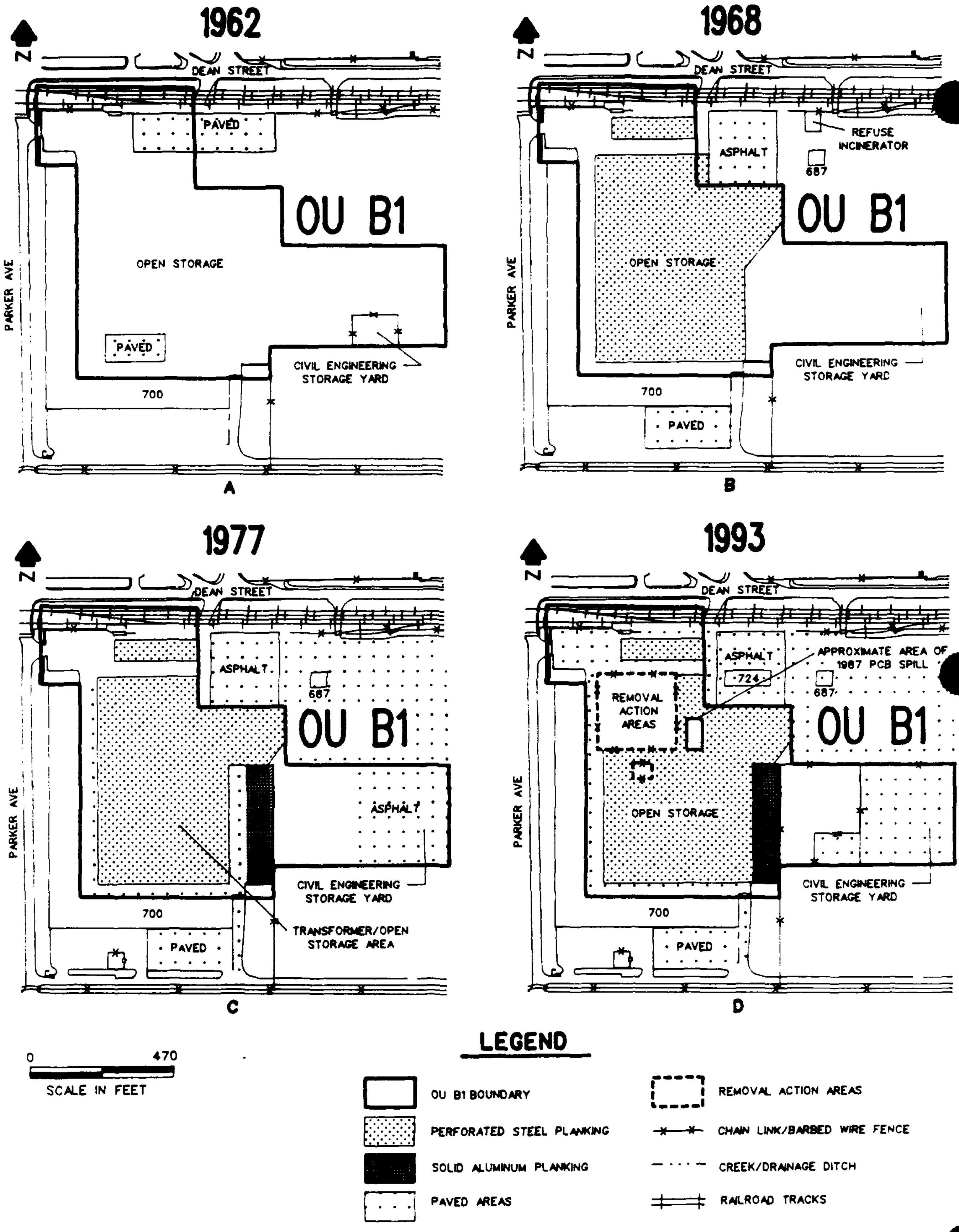

Figure 2-1. History of OU B1

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2.3 Regulatory and Enforcement History

McClellan AFB was listed on the U.S. Environmental Protection Agency's (U.S. EPA) National Priorities List (NPL) on 22 July 1987. At McClellan AFB, the Air Force is the principle responsible party and the lead agency for conducting investigative and cleanup activities under CERCLA. On 02 May 1990, the Air Force, the U.S. EPA Region IX, and the California EPA Department of Toxic Substances Control (Cal/EPA DTSC) (known then as the Department of Health Services) signed an Interagency Agreement (IAG) for McClellan AFB to ensure that environmental impacts from past and present operations are thoroughly investigated and appropriate cleanup actions are taken to protect public health, welfare, and the environment. The U.S. EPA, the Cal/EPA DTSC, and the Regional Water Quality Control Board (RWQCB) provide regulatory oversight consisting of technical support, review, and comment on all investigative and cleanup work at McClellan AFB.

Operable Unit B1 is proposed to be the first OU to advance through the CERCLA process at McClellan AFB because the contamination poses a potential threat to the environment and to human health should the contaminants migrate into an exposure pathway. The draft RI/FS Report was submitted in March of 1993, and the final was completed on 02 July 1993.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Remedial Project Managers from each regulatory agency and from McClellan AFB meet quarterly in what is known as the Technical Review Committee (TRC). The purpose of the TRC is to review project status and planned activities. Public representatives from the County of Sacramento, the City of Sacramento, and an on-base union also take part in the TRC.

To support RI/FS work at McClellan AFB, a Community Relations Plan (CRP) was developed in December 1985 and updated in February 1988 and again in January 1991. Community interest and involvement in McClellan AFB's Installation Restoration Program (IRP) has been continuous. McClellan AFB holds public meetings on an as-needed basis, but at least twice per year, to respond to community questions and concerns. Since December 1987, a quarterly newsletter has been published, and several McClellan AFB fact sheets have been developed to explain technical aspects or upcoming activities to the general public; the newsletters have been mailed to approximately 2,500 members of the surrounding community. Fact sheets are distributed as needed.

The community participated in the Interim Record of Decision (ROD) through a formalized comment process. Community members received a fact sheet summarizing the Proposed Plan in April 1993. They were encouraged to provide comment during the 30-day public comment period, from 16 June to 16 July 1993. This comment period was also announced through a public notice published in the *Sacramento Bee*, a daily newspaper of general circulation. A public meeting was held on 30 June 1993 at 7:00 p.m. at Bell Avenue Elementary School. A transcript of this meeting is presented here as Attachment B. Public comments were recorded, along with responses, in the Responsiveness Summary. The Summary is presented here as Attachment A, and is also available to the public at the AR repositories. Attachment C presents an index of the Administrative Record.

4.0 SUMMARY OF SITE CHARACTERISTICS

Based on their reported concentrations, toxicity, and frequency of detection, the following chemicals were identified as 16 chemicals of concern (COCs) for OU B1 (Table 4-1):

TABLE 4-1. CHEMICALS OF CONCERN AT McCLELLAN AFB OU B1

Arsenic
Benzene
Cadmium
Chromium
Copper
1,1-Dichloroethene (1,1-DCE)
Congeners of dioxin and furan compounds
Lead
Mercury
Molybdenum
The PCB Arochlor 1260
Selenium
Silver
Tetrachloroethene (PCE)
Trichloroethene (TCE)
Zinc

The only PCB reported in OU B1 was Arochlor 1260. Therefore, in this report, the term "PCB" refers to Arochlor 1260.

4.1 Geology

Operable Unit B1 is underlain by alternating discontinuous sands, silts, gravels, and clays typical of the alluvial overbank and fluvial deposits of the region (Figure 4-1). The soils underlying the study area have highly variable percentages of clay, silt, sand, and gravel; stratigraphic contacts between soil types vary from sharp to gradational in the vadose zone (0 to 105 feet BGS) and shallow saturated zone (105 to 400 feet BGS). The top 6 to 8 inches of soil consists mostly of a mixture of sand, silt, and gravels. A thin hardpan layer is present beneath OU B1 at depths ranging from 3 to 8 feet BGS. This hardpan layer, along with fine-grained lithologies, restricts the vertical movement of contaminants.

The water table beneath OU B1 is currently at 105 feet BGS, but during the 1960s, when the area was first used for open storage, the water table was as shallow as 75 feet BGS. The water table has declined approximately one foot per year.

Groundwater flows beneath McClellan AFB from the east and is drawn toward depressions in the groundwater surface created by well pumping. In the vicinity of OU B1, flow is to the south-southeast toward a regional depression created by McClellan AFB and municipal supply wells. Recharge of groundwater by surface water at McClellan AFB is limited due to the extensive paving and storm drainage system, and because of the less permeable shallow hardpan layers that occur in the vadose zone soils.

4.2 Contaminant Source Areas

The RI at OU B1 was focused on surface and near-surface soils in the open storage lot east and north of Building 700, where 1,745 surface scrapes were collected and 68 soil borings were drilled during the RI (Overlay A). One polychlorinated biphenyl (Arochlor 1260), dioxins, furans, petroleum hydrocarbons, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganic species were reported in OU B1 soils, primarily in the near-surface

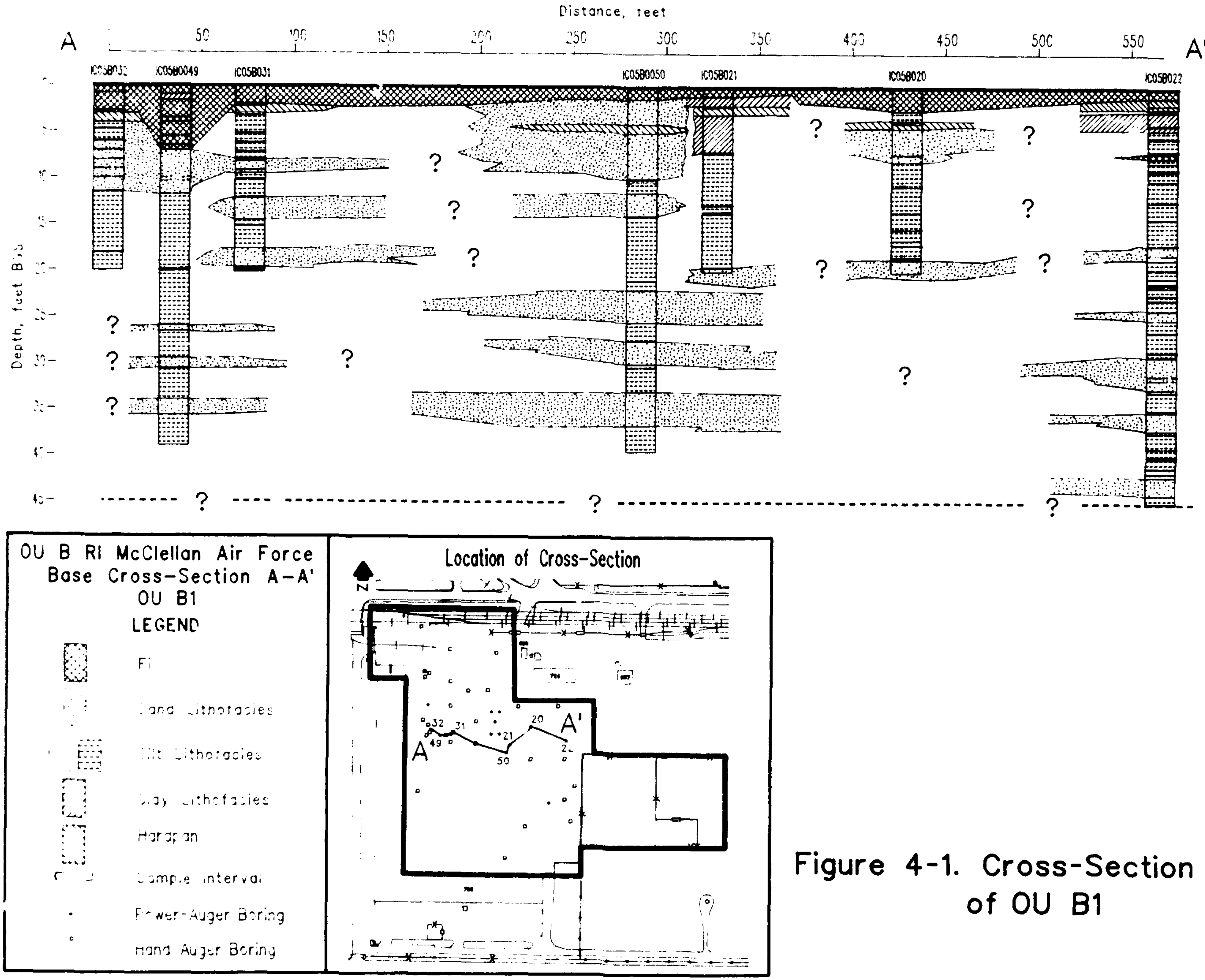


Figure 4-1. Cross-Section A-A' of OU B1

areas. Based on results from soil samples collected and analyzed, shallow soil contamination at OU B1 is widespread laterally, but limited in the vertical extent.

4.2.1 PCBs and Dioxins/Furans

Soil — Widespread, low-level (less than 10 mg/kg) PCB contamination in near-surface soils is present throughout the unpaved areas of OU B1 (Overlay B). The waste oil that was reportedly applied to the soil to control dust during the 1960s probably accounts for the widespread low-level PCB contamination found at OU B1. However, subsequent surface water runoff may also have contributed to the widespread contamination. The highest concentrations of PCBs (500 to 240,000 mg/kg) were reported in the north-west portion of the DRMO storage yard where transformers were unloaded and stored.

Most of the PCB contamination is concentrated within the upper foot of soil. In the area of highest surface soil PCB concentrations, the vertical extent of PCB-contaminated soils is estimated to be 6 feet BGS (Overlays C and D). No PCB-contaminated soils were reported below 6 feet BGS.

Low-level dioxin and furan contamination in surface soils is also widespread throughout the unpaved areas of OU B1 (Overlay E). There appears to be a relationship between PCB and dioxin/furan concentrations in soil: as concentrations of PCBs increase, concentrations of dioxin and furan congeners increase. Several different dioxin and furan isomers were reported; to compare their toxicity, the international toxic equivalency factor (I-TEF) method was applied to convert the concentrations of different isomers to an equivalent concentration of the most toxic isomer, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The 2,3,7,8-TCDD equivalents (TCDDeq) are less than 1 microgram per kilogram (μg/kg), except in the area of highest PCB contamination. In the area where PCB concentrations were the highest (>500 mg/kg), pentachloro-dibenzodioxin (PeCDD) and pentachloro-dibenzofuran (PeCDF) were reported in four samples, but these could not be quantified due to PCB interference.

Sediment — PCB contamination was reported in all three of the drainage ditches that receive runoff from OU B1 (Figure 4-2). Concentrations decrease with distance from the DRMO storage yard, from 470 mg/kg in a ditch at the yard to 4.2 mg/kg at the point where runoff enters Magpie Creek. Dioxin contamination was reported in samples collected from the drainage ditches. No PCBs or dioxins were reported in Magpie Creek.

Inorganic species reported in ditch and creek sediments were compared to subsurface soil background concentrations because no surface or sediment background concentrations have been established. Arsenic (3.7 to 5.0 mg/kg), cadmium (0.74 to 11.0 mg/kg), lead (21 to 180 mg/kg), and zinc (70 to 330 mg/kg) were the inorganic species most frequently reported above subsurface soil background concentrations in drainage ditch sediments. Cadmium (3.6 mg/kg) and lead (11 mg/kg) were reported above background in only one Magpie Creek sample.

Surface Water — Surface water grab samples were also collected from the drainage ditches by McClellan AFB Environmental Management staff (10/29/92 and 12/09/92) and the Regional Water Quality Control Board (RWQCB) (12/21/92) during three storm events between October and December 1992

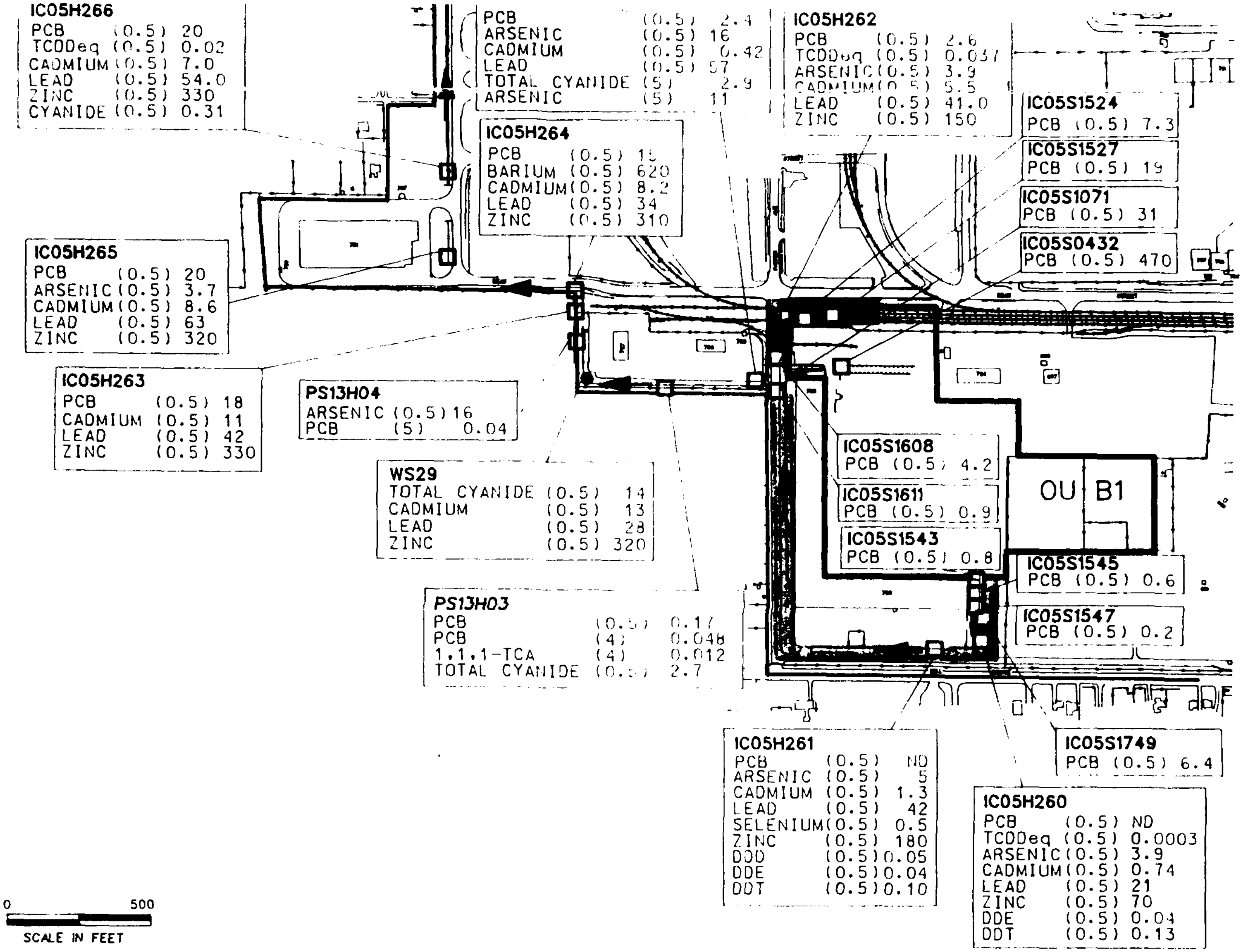
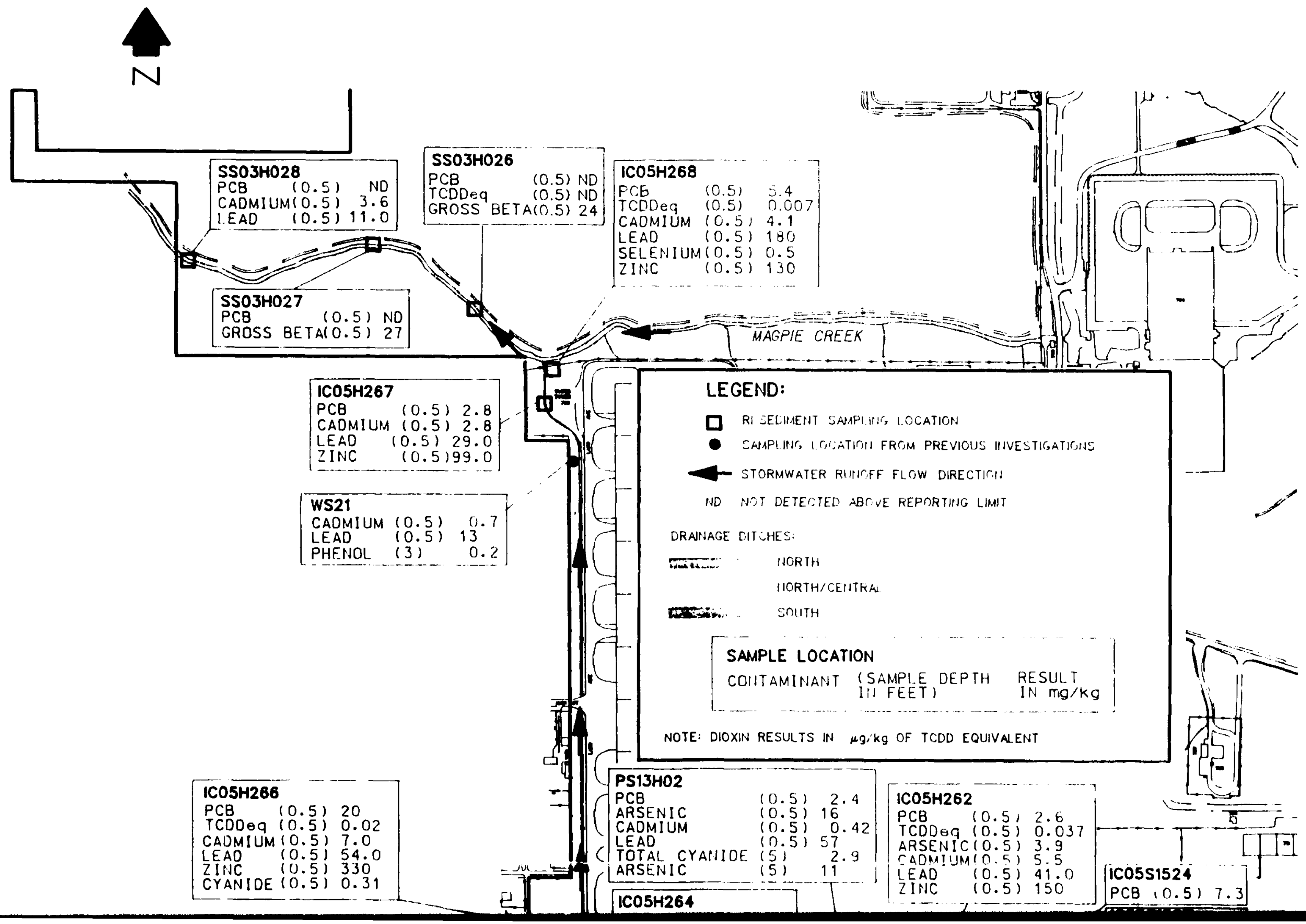


Figure 4-2. Sediment Sampling Locations at OU B1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SS03H028
PCB (0.5) ND
CADMIUM (0.5) 3.6
LEAD (0.5) 11.0
SS03H027
PCB (0.5) ND
GROSS BETA (0.5) 27
SS03H026
PCB (0.5) ND
TCDDeq (0.5) ND
GROSS BETA (0.5) 24
IC05H268
PCB (0.5) 5.4
TCDDeq (0.5) 0.007
CADMIUM (0.5) 4.1
LEAD (0.5) 180
SELENIUM (0.5) 0.5
ZINC (0.5) 130
MAGPIE CREEK
IC05H267
PCB (0.5) 2.8
CADMIUM (0.5) 2.8
LEAD (0.5) 29.0
ZINC (0.5) 99.0
WS21
CADMIUM (0.5) 0.7
LEAD (0.5) 13
PHENOL (3) 0.2
LEGEND:
SEDIMENT SAMPLING LOCATION
SAMPLING LOCATION FROM PREVIOUS INVESTIGATIONS
STORMWATER RUNOFF FLOW DIRECTION
ND NOT DETECTED ABOVE REPORTING LIMIT
DRAINAGE DITCHES:
NORTH
NORTH/CENTRAL
SOUTH
SAMPLE LOCATION
CONTAMINANT (SAMPLE DEPTH IN FEET) RESULT IN mg/kg
NOTE: DIOXIN RESULTS IN µg/kg OF TCDD EQUIVALENT
IC05H266
PCB (0.5) 20
TCDDeq (0.5) 0.02
CADMIUM (0.5) 7.0
LEAD (0.5) 54.0
ZINC (0.5) 330
CYANIDE (0.5) 0.31
PS13H02
PCB (0.5) 2.4
ARSENIC (0.5) 16
CADMIUM (0.5) 0.42
LEAD (0.5) 57
TOTAL CYANIDE (5) 2.9
ARSENIC (5) 11
IC05H262
PCB (0.5) 2.6
TCDDeq (0.5) 0.037
ARSENIC (0.5) 3.9
CADMIUM (0.5) 5.5
LEAD (0.5) 41.0
ZINC (0.5) 150
IC05S1524
PCB (0.5) 7.3
IC05H264

before the HDPE liner was placed over soils in OU B1. Samples were collected from five locations originating at OU B1 and ending where the drainage ditch empties into Magpie Creek (Figure 4-3). Not all locations were sampled during each storm event. In the figure, "NS" means the location was not sampled during that event. An "NR" indicates no contaminants were reported above detection limits. Based on the data collected for the three storm events (in some cases with just one sampling location), the following conclusions were reached:

- Surface water runoff from the southern part of OU B1 is not contaminated with PCBs, dioxins, or furans (sampling location EM-3).

- Surface water runoff from the north/central portion of OU B1, which includes the area of highest PCB concentrations, contains the highest concentrations of PCBs (190 μg/L) and dioxins (829 picograms per liter [pg/L] TCDDeq) in the runoff (sampling location EM-5).

- Surface water collected from 500 feet downstream of OU B1 contained PCBs (83 μg/L) and dioxins (535 pg/L TCDDeq), which are about half the concentrations reported at the DRMO storage lot (sampling location EM-4).

- Polychlorinated biphenyls were not reported in surface water collected where the drainage ditch flows into Magpie Creek. Dioxins were reported at the detection limit (0.45 pg/L TCDDeq) (sampling location EM-8).

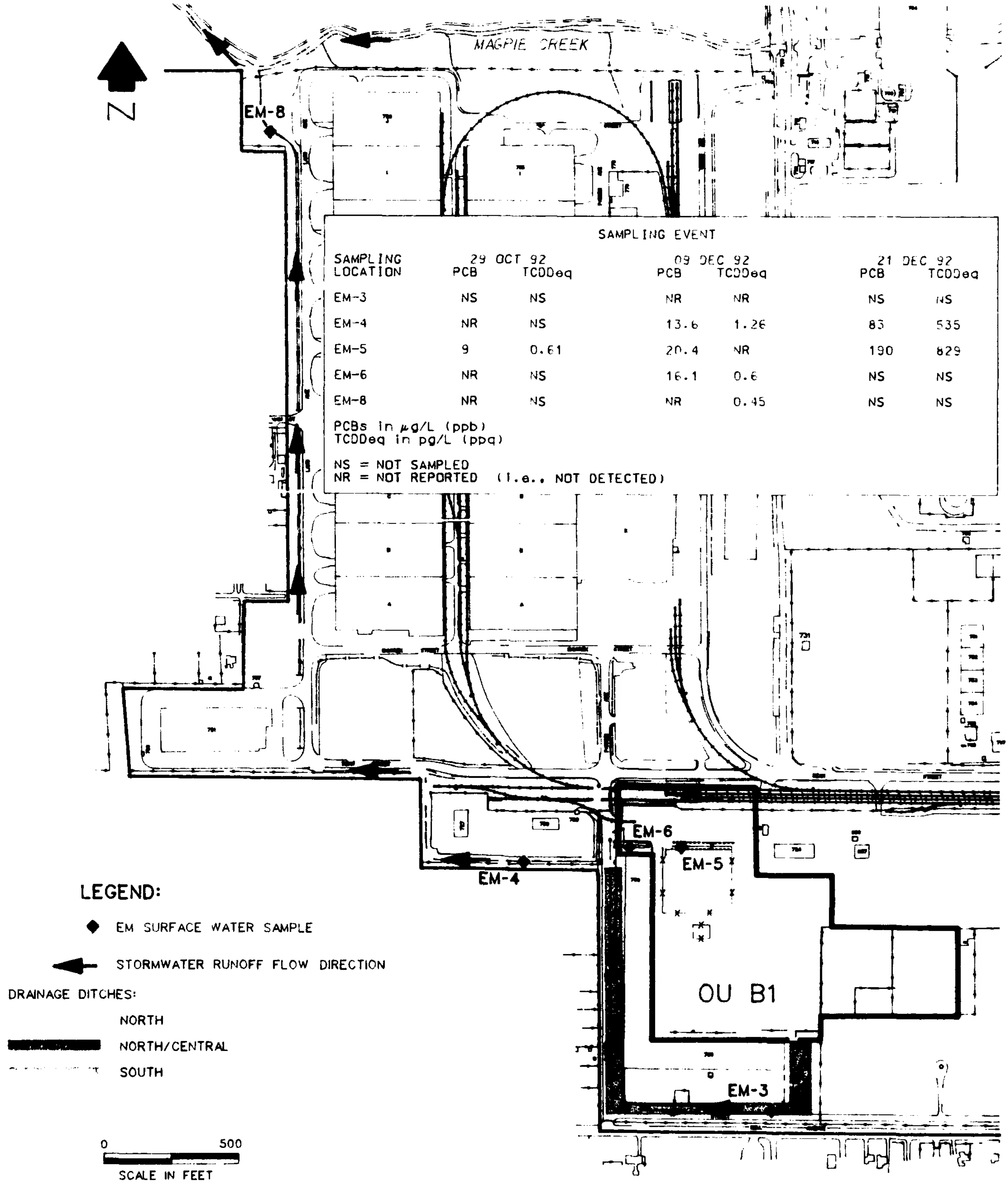
The samples which led to the above conclusions were taken prior to the emplacement of the protective synthetic liner over soils in OU B1. Analytical results from samples collected by the RWQCB after liner emplacement indicate that PCB concentration in runoff from the DRMO and the associated ditches had decreased.

Groundwater samples have not been collected for PCB, dioxin, or furan analysis in monitoring wells downgradient of OU B1. However, it is unlikely that the groundwater is contaminated with PCBs, dioxins, or furans because the vertical extent of contamination determined by soil sampling is 6 feet BGS in OU B1, and these compounds are not likely to migrate to groundwater (Section 4.3.4). Therefore, it is unlikely that OU B1 is or will be a source of groundwater contamination.

4.2.2 Petroleum Hydrocarbons

Petroleum hydrocarbon (motor oil and heavy hydrocarbons) contamination is widespread in OU B1 surface soils at concentrations less than 100 mg/kg (Overlay F). The widespread contamination is most likely due to the spraying of waste oil on the soils to control dust in the 1960s. Concentrations of petroleum hydrocarbons from 3,400 to 8,700 mg/kg were also reported in surface soils in the area of highest PCB contamination. This contamination was most likely discharged from transformer leaks or spills.

Petroleum hydrocarbons (motor oil and heavy hydrocarbons) were also reported in soil samples from 1 to 4 feet BGS in OU B1 (Overlay G). The highest concentration (300 mg/kg) appears to have been discharged from a surface spill. The vertical extent of hydrocarbon contamination is not defined in two shallow borings, where concentrations of 300 mg/kg and 130 mg/kg, respectively, were



SAMPLING LOCATION	SAMPLING EVENT 29 OCT 92 PCB	TCDDeq	09 DEC 92 PCB	TCDDeq	21 DEC 92 PCB	TCDDeq
EM-3	NS	NS	NR	NR	NS	NS
EM-4	NR	NS	13.6	1.26	83	535
EM-5	9	0.61	20.4	NR	190	829
EM-6	NR	NS	16.1	0.6	NS	NS
EM-8	NR	NS	NR	0.45	NS	NS

PCBs in μg/L (ppb)
TCDDeq in pg/L (ppq)

NS = NOT SAMPLED
NR = NOT REPORTED (i.e., NOT DETECTED)

Figure 4-3. Surface Water Sampling Locations in OU B1 and Drainage Ditches reported in samples collected from the bottom of each shallow boring (3 feet BGS). In other areas, petroleum hydrocarbon concentrations decrease to much lower values over short vertical distances (3 feet).

4.2.3 Semivolatile Organic Compounds

Semivolatile organic compound contamination was also reported in the area of the PCB and petroleum hydrocarbon contamination. 1,2,4-Trichlorobenzene (1,2,4-TCB) was reported at concentrations as great as 69 mg/kg in the area of highest PCB concentrations. This SVOC is commonly used to thin transformer oils and was most likely discharged through spills or leaks of transformer oils. Polynuclear aromatic compounds, that occur in waste oils as by-products of combustion, were reported at concentrations less than 3 mg/kg.

4.2.4 Metals

In surface soil samples, ten inorganic species were reported above background concentrations for subsurface soils throughout OU B1. The widespread distribution of cadmium, lead, selenium, and silver in surface soils suggests that inorganic constituents were not discharged in separate spills. This distribution may have been caused by the application of waste oils and/or transport by surface water runoff. Cadmium and selenium are common trace constituents in fuel hydrocarbons. Lead may accumulate in waste oils from engines using gasoline, and silver was commonly used as an engine bearing alloy (ATSDR, 1989-1990).

In subsurface soil samples, only two inorganic species were reported at five times greater than background concentrations for subsurface soils (McClellan AFB, 1993). Concentrations greater than five times background are considered high enough to evaluate potential risks. Concentrations less than five times background are not considered statistically significant and are not used in risk assessment calculations. Selenium and/or silver were reported at five times greater than subsurface background concentrations in six borings. The maximum concentration of selenium was 22 mg/kg in Boring 41 at 8.7 feet BGS. The maximum concentration of silver was 3.0 mg/kg in Boring 50 at 10 feet BGS.

Inorganic species reported in ditch and creek sediments were compared to subsurface soil background concentrations because no surface or sediment background concentrations have been established. Arsenic (3.7 to 5.0 mg/kg), cadmium (0.74 to 11.0 mg/kg), lead (21 to 180 mg/kg), and zinc (70 to 330 mg/kg) were the most inorganic species frequently reported above subsurface soil background concentrations in drainage ditch sediments. Cadmium (3.6 mg/kg) and lead (11 mg/kg) were reported above background in only one Magpie Creek sample.

4.2.5 Volatile Organic Compounds

Low concentrations (100 μg/kg) of VOCs were reported in OU B1 soils. Distribution is limited to small noncontinuous areas. This distribution of widely-spaced low concentrations suggest that the VOCs were discharged from separate, minor surface spills. Low-level contamination in one boring is present from 32 to 95 feet BGS. Concentrations of the VOCs generally increase toward the water table, indicating that the contamination may be residue from contaminated groundwater that historically flowed beneath OU B1 at depths less than 100 feet (75 feet BGS in the 1960s).

Volatile organic compounds were reported in soil gas in the northern portion of OU B1. The VOCs are not widely distributed. The highest concentrations found were at 21 feet BGS: greater than 100,000 parts per billion by volume (ppbv) of halogenated VOCs (HVOCs) (TCE, PCE, cis-1,2-DCE). These concentrations were only reported in one boring. Soil gas concentrations at 21 feet BGS decrease with horizontal distance from this boring. Soil gas concentrations also decrease with depth. In one boring, no HVOC concentrations were reported in soil gas samples collected from 30 to 60 feet BGS. However, at 81 feet BGS, HVOCs were reported at 11,600 ppbv. This suggests that there are two sources of soil gas contamination: small surface spills and residue from groundwater contamination.

4.3 Transport of Site Chemicals

4.3.1 Contaminant Properties

The potential for transport of contaminants in the environment is largely determined by the chemical and physical properties of the contaminants.

The properties that affect the ability of the contaminants in OU B1 to be transported (mobility) in a pathway are vapor pressure, solubility, Henry's Law Constant, and partitioning coefficients. These properties are listed for the most frequently reported and potentially hazardous contaminants in Table 4-2.

Vapor pressure indicates the potential for the contaminants to enter the vapor phase from the liquid phase in soils and to be transported in soil gas. The VOCs, with higher vapor pressures at 25 degrees celsius (C), have greater potential to enter the vapor phase than PCBs or dioxin and furan compounds. Of the inorganic species, only metallic mercury, if present in soils, would have a measurable vapor pressure at 25 C.

Aqueous solubility indicates the maximum concentration (in μg/kg of water) that the organic compounds or inorganic species can attain at 25 C. Surface or groundwater in contact with liquid, solid, or vapor phases of any of the contaminants listed in Table 4-2 can dissolve the contaminant up to this limit at this temperature. Solubility limits for inorganic constituents are shown as broad ranges because the compounds in which they occur have not been identified, and the aqueous solubility of each inorganic species depends on the specific compound or organic complex it has formed in the soil.

Henry's Law Constants (H) are indicators of the behavior of the organic contaminants when their vapor phases are in contact with water in the soil. Higher values of H indicate which contaminants are more likely to partition to the vapor phase after being dissolved in water. The H values are most indicative of exchanges between vapor phases in soil gas and subsurface water.

The solid phase partitioning coefficients, K_{oc} and K_d, in Table 4-2 are indicators of contaminant properties that decrease the mobility of contaminants in liquids. Inorganic species may adsorb onto organic material or inorganic mineral grains (clays or iron oxides) in soils. Adsorption to soil grains can hold contaminants in soils even though surface or groundwater that has not reached the solubility limit is moving through the soils. Solid phase partitioning retards the movement of contaminants in the liquid phase. However, if the soil grains are transported by water or wind, the adsorbed contaminants will also be transported.

The relative persistence of the contaminants in the environment is indicated in the last column of Table 4-2. Of the contaminants in OU B1, the PCB, dioxin, and furan compounds having the most chlorine or fluorine atoms in their structure are the most persistent. All inorganic species are persistent because they are not transformed or mineralized, in spite of changes in their physical or chemical state.

4.3.2 Transport Mechanisms

This section discusses the transport of site and the factors that may have influenced chemical migration.

The principal mechanisms that may affect the movement of contaminants in OU B1 are shown schematically in Figure 4-4. Table 4-3 summarizes the COCs affected by each mechanism, properties limiting mobility, and pathways potentially impacted by each mechanism in OU B1 under current conditions.

Volatilization — Volatilization is considered to be a potential transport mechanism possibly resulting in the loss of organic vapors in shallow soil to the atmosphere. Although PCBs have vapor pressures 100,000 to 1,000,000 times lower than VOCs reported in the soils of OU B1, PCBs in surface soils are locally 5,000 to 2,400,000 times more concentrated than VOCs. Therefore, volatilization is considered a transport mechanism for Arochlor 1260 in OU B1.

All organic compounds in OU B1 soil may enter the vapor phase and migrate by diffusion or density-driven advection in soil gas. Vapor phase contaminants have the potential of migrating to the soil surface or to groundwater. The concentrations of organic compounds in soil gas at the soil surface are likely to be diluted by dispersion in the pathway. This mechanism would allow COCs to enter the air pathway at low concentrations.

Dissolved Aqueous Transport — Inorganic species and VOCs are more soluble in water than Arochlor 1260 and would be transported more readily by water in the vadose zone or the saturated zone. Volatile organic compounds have lower K_{oc} and K_d values (numbers representative of a compound's tendency to attach to soil organic particles instead of dissolving in water or some other solvent) than PCBs, dioxins, or inorganic species and do not strongly adsorb to particulate matter. Polychlorinated biphenyls and dioxins do not readily dissolve in water and strongly adsorb onto soils.

Very low aqueous solubilities of the more highly concentrated organic COCs and the tendency of all COCs to adsorb to organic material suggest that the total mass of COCs transported by this mechanism from OU B1 is much less than the mass transported by colloidal or fine particle transport. The potential for surface water transport by this mechanism is greater than the potential for groundwater transport.

Colloid/Particle Transport — Colloid/particle transport could be a potential mechanism for facilitating migration of PCBs at the site because PCB Aroclor 1260 has a high K_{oc}, and thus strongly adsorbs on soil, colloids, and other particulates. Analytical data from sediments downstream from OU B1 indicate this mechanism is active.

TABLE 4-2. MAXIMUM CONCENTRATIONS AND PHYSICAL AND CHEMICAL PROPERTIES (AT 25 C) OF CONTAMINANTS OF CONCERN IN OU B1[a]

	Maximum Concentration Reported in Soil or Soil Gas ($\mu g/kg$)	Vapor Pressure (mm Hg)	Aqueous Solubility ($\mu g/kg$)	Solid Phase Partitioning Coefficients K_{oc} or K_d (L/Kg)	Henry's Law Constant $\left(\frac{\mu g/L \text{ in gas}}{\mu g/L \text{ in water}}\right)$	Relative Persistence
ORGANIC COMPOUNDS						
PCB Arochlor 1260	2.4×10^8	4.1×10^{-5}	27	$6 \times 10^5 - 1 \times 10^6$	0.013	P
Dioxin Congeners						
TCDD	1.0	7.4×10^{-10}	1.9×10^{-2}	1.6×10^{5} [b]	7×10^{-4}	
PCDD	1.45	$<7.4 \times 10^{-10}$	—	—	$<7 \times 10^{-4}$	
HxDD	1.8	$<7.4 \times 10^{-10}$	4×10^{-3} [c]	$>1.6 \times 10^5$	$<7 \times 10^{-4}$	
HPCDD	3.38	$<7.4 \times 10^{-10}$	2.4×10^{-3} [c]	$>1.6 \times 10^5$	$<7 \times 10^{-4}$	
OCDD	10.9	$<7.4 \times 10^{-10}$	4×10^{-4} [c]	$>1.6 \times 10^5$	$<7 \times 10^{-5}$	P
TCDF	17.8	5.4×10^{-8} [d]	4.2×10^{-1} [c]	$3.5 \times 10^4 - 4 \times 10^6$	2.3×10^{-3}	
PCDF	19.1	$<5.4 \times 10^{-8}$	—	$>3.5 \times 10^4 - 4 \times 10^6$	$<2.3 \times 10^{-3}$	
HxCDF	20.9	$<5.4 \times 10^{-8}$	8.2×10^{-3} [c]	$>3.5 \times 10^4 - 4 \times 10^6$	$<2.3 \times 10^{-3}$	
HpCDF	7.8	$<5.4 \times 10^{-8}$	1.4×10^{-3} [c]	$>3.5 \times 10^4 - 4 \times 10^6$	$<2.3 \times 10^{-3}$	
OCDF	6.23	$<5.4 \times 10^{-8}$	1.2×10^{-3} [c]	$>3.5 \times 10^4 - 4 \times 10^6$	$<2.3 \times 10^{-3}$	P
1,1-DCE	9,100 ppbv	600	2.25×10^6	65	1.42	
Benzene	37 ppbv	95.2	1.8×10^6	83	0.23	
TCE	72,000 ppbv	57.9	1.1×10^6	126	0.38	
cis-1,2-DCE	17,000 ppbv	208	3.5×10^6	72.4	0.32	
PCE	30,000 ppbv	17.9	1.5×10^5	364	1.25	

(Continued)

TABLE 4-2. (Continued)

	Maximum Concentration Reported in Soil (mg/kg)	Vapor Pressure (mm Hg)	Aqueous Solubility (μg/kg)	Solid Phase Partitioning Coefficients K_{oc} or K_d (L/Kg)	Henry's Law Constant (μg/L in gas / μg/L in water)	Relative Persistence
INORGANIC SPECIES						
Arsenic Species	47	N/A	$0 - 302 \times 10^7$ [f]	Strongly sorbed.[f,h]	N/A	
Cadmium Species	49	N/A	$0 - 1.4 \times 10^9$ [f]	Sorbed to organic material; forms mobile aqueous complexes.[f,h]	N/A	P
Chromium Species	590	N/A	Cr^{+6} $40 - 238 \times 10^7$ [f] Cr^{+3} $0 - 120 \times 10^7$ [f]	Cr VI reduced to Cr III by Fe II and organic material; Cr III sorbed/complexed by organic material.[g,h]	N/A	P
Mercury Species	7.5	2.3×10^{-3} [f] (Hg metal)	$0 - 2 \times 10^3$ [f]	Strongly sorbed to organic material.[f,h]	N/A	P
Lead Species	2,500	N/A	$0 - 4.2 \times 10^4$ [f]	Strongly sorbed to organic material.[f,h]	N/A	P
Selenium Species	52	N/A	$0 - 1.1 \times 10^9$ [f]	5.9 - 14.9 [f]	N/A	P
Silver Species	74	N/A		10 - 100 [f]	N/A	P

[a] Values from Hazardous Substances Data Bank (1992) or U.S. EPA (1986) unless otherwise noted.
[b] Value estimated from $\log K_{oc} = 0.544 \log K_{ow} + 1.377$ (Kanega and Goring, 1980).
[c] Values from Friesen, Vilka, and Muir (1990).
[d] Value estimated from Henry's Law constant and aqueous solubility.
[e] Value estimated from $\log K_{oc} = 0.72 \log K_{ow} + 0.49$ (Schwarzenbach and Westall, 1981).
[f] From Toxicological Profiles (ATSDR, 1989a, 1989b, 1989c, 1989d, 1990, 1991).
[g] From Palmer and Wittbrodt (1991).
[h] No K value found.

K_{oc} = Organic Carbon/Water Partition Coefficient
K_d = Soil/Water Partition Coefficient
L/kg = Liters per kilogram.
mm/Hg = Millimeters of mercury.
N/A = Not available or not applicable.
P = Compound or inorganic species will persist longer than other COCs of the same type.
μg/kg = Micrograms per kilogram.
μg/L = Micrograms per liter.

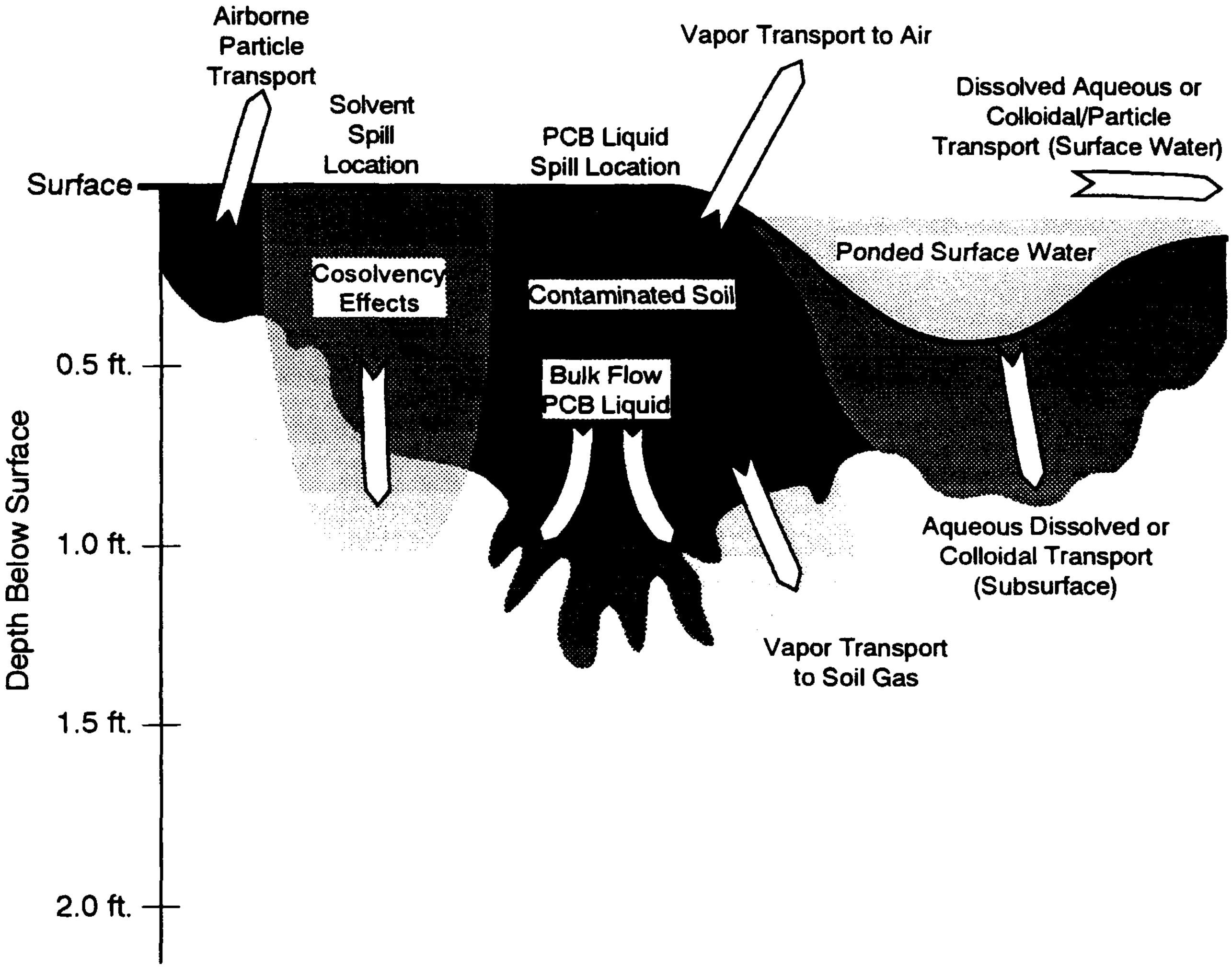


Figure 4-4. Schematic Diagram of Potential Transport Mechanisms at OU B1

TABLE 4-3. MECHANISMS OF COC TRANSPORT IN OU B1

Mechanism	COCs Mobilized	Mobility Limited By	Pathways Potentially Impacted	Pathways Known to be Impacted
Volatilization	VOCs PCB Arochlor 1260 Dioxins/furans	 Low vapor pressure Low vapor pressure	Surface air Groundwater	
Bulk flow (nonaqueous phase transport)	PCB Arochlor 1260	High liquid viscosity; high adsorption	Groundwater	
Dissolved aqueous transport	VOCs Inorganic species PCB Arochlor 1260 Dioxins/furans	High Henry's constant Absorption Low solubility; adsorption Low solubility; adsorption		Surface water Groundwater (migration from another source area)
Colloidal/fine (0.01 to 5 micron) particle aqueous transport	PCB Arochlor 1260 Dioxins/furans Inorganic species	Water flow velocity for larger particles	Groundwater	Surface water sediments
Airborne particle transport	PCB Arochlor 1260 Dioxins/furans Inorganic species	Surface covering; wind speed	Surface air	
Cosolvent effects	PCB Arochlor 1260	Volume and concentration of cosolvent	Groundwater	
Preferential Pathways	All in liquid or vapor	Soil tension and capillarity	Surface air Groundwater	

COCs = Contaminants of Concern
K_{oc} = Organic carbon/water partitioning coefficient
PCB = Polychlorinated biphenyl
VOCs = Volatile organic compounds

Cosolvent Effects — Cosolvent effects are a potential mechanism for transporting a PCB at the site because PCB Aroclor 1260 has a high affinity for some hydrocarbon solvents. Although Archlor 1260 may have initially been transported to depths of 6 feet due to cosolvent effects, it does not appear that solvents can have any current effects on the transport of Archlor 1260 in the vadose zone. The enhancement of migration by cosolvency requires concentrations of 1% or more of suitable solvent. The greatest solvent concentration in soils in the area of high Arochlor 1260 concentration was 69 mg/kg of 1,2,4-trichlorobenzene. This concentration is one thousand times less than the concentration needed to increase transport of Arochlor 1260. Therefore, this mechanism is not actively transporting Archlo 1260 to groundwater beneath OU B1.

Airborne particles — Fine soil particles are present on the surface of the PSP, solid aluminum planking, and uncovered soils. These particles may carry adsorbed COCs from the soils covered by planking. Under current conditions in OU B1, equipment operation, vehicle traffic, and winds cause fine soil particles to rise into the air transport pathway.

Bulk Flow — This mechanism is unlikely to have any impact on the groundwater pathway beneath OU B1. Evidence from subsurface sampling and analysis indicates that PCBs have penetrated no more than 6 feet below the surface. The historical practice of unloading and cleaning transformers has been discontinued. Therefore, Aroclor 1260 is unlikely to migrate to greater depths by this mechanism. Soils deeper than 6 feet BGS may have been penetrated locally by the bulk flow of transformer fluids.

Preferential Pathways — A preferential pathway is a more permeable pathway through the subsurface. These subsurface features may consist of plant root bores through fine-grained layers or cracks in cemented hardpan layers. Contaminated liquids or soil gas may be transported in the vadose zone more quickly through these root bores or cracks than they would through pores in fine-grained soils. However, root bores and cracks are not present in each fine-grained layer and, therefore, are not continuous through the vadose zone. Preferential pathways are more likely to increase the rate of contaminant migration in soil gas than the rate of liquid migration because of tension and capillary forces acting on liquids in the vadose zone.

4.3.3 Persistence

Without the implementation of remedial measures, contaminants in OU B1 may persist or be degraded by natural processes. Highly chlorinated PCBs (e.g., Aroclor 1260) are relatively resistant to biodegradation under aerobic conditions. Petroleum hydrocarbons can be biodegraded by aerobic bacteria that exist naturally in the soil of OU B1. Biodegradation of chlorinated VOCs is unlikely to occur under oxygen-rich vadose-zone conditions, but it will occur very slowly under saturated conditions. Oxidation, hydrolysis, and photolysis of PCBs, petroleum hydrocarbons, VOCs and SVOCs are all generally insignificant processes in natural environments.

4.3.4 Transport Pathways

Site conditions and the distribution of COCs in OU B1 indicate the transport mechanisms that may be active and the transport pathways that are likely to be complete. The site conditions and COC distributions that indicate complete and incomplete pathways are provided in the following discussions of surface, subsurface, and groundwater transport.

Potential for Surface Transport

Two surface transport pathways, air and water, have been impacted by COCs from OU B1. Approximately 27% of the soil surface area has remained uncovered since COCs were discharged; therefore, the surface transport pathways have been open to the COCs in surface and near-surface soils.

Surface soil analytical results indicate that Arochlor 1260, arsenic, cadmium, chromium, lead, mercury, selenium, and silver are widespread and present in greater concentrations than other COCs. Dioxin and furan congeners are widespread in surface soils, but are present at one one-thousandth to one one-billionth of the concentration of other COCs. Volatile organic compound concentrations were reported in subsurface soils; however, they may impact the surface air pathway by upward migration of vapor in soil gas.

Surface Air Transport Pathway -- The COCs in soils of OU B1 are entering this transport pathway. Vapor concentrations at the soil surface are very low, but may be emitted into the pathway over 30 years or longer.

Vapor concentrations of approximately 6×10^{-8} grams per liter (g/L) of Arochlor 1260, estimated from its vapor pressure at 25 C, are emitted from the surface and near-surface soils and enter the atmosphere through uncovered soil surfaces. Concentrations of VOCs in soil gas that will reach the soil surface over the next 30 years as a result of upward diffusion from the subsurface are estimated to be: 8×10^{-8} g/L of 1,1-DCE, 3×10^{-8} g/L of benzene, 1×10^{-6} g/L of TCE, 9×10^{-7} g/L of PCE, and 2×10^{-7} g/L of cis-1,2-DCE. The VOC concentrations in soil gas were determined from vadose zone modeling.

Fine soil particles may carry adsorbed COCs from the soil surfaces not covered by planking. Under current conditions, equipment operation, vehicle traffic, and winds cause fine soil particles to rise into the air transport pathway. The predominant wind directions across OU B1 are southerly and southeasterly. There are no analytical data with which to determine COC concentrations on the particles or the distance that COC-contaminated airborne particles may have been transported from OU B1.

Surface Water Pathway -- Surface water and drainage ditch sediment sample analyses indicate that some of the COCs are entering the surface water pathway. Concentrations of COCs in this pathway are much greater than those estimated for other pathways, and the COCs may be carried to Magpie Creek in stormwater runoff. Surface water drainage directions in OU B1 are shown in Figure 4-5.

Fine particles of soil, coated with waste oil and natural organic carbon, carrying adsorbed Aroclor 1260, dioxin and furan compounds, and inorganic species may be suspended in runoff that cannot infiltrate OU B1 soils. Rain that does not run off to drainage ditches flows to depressions on the PSP where it may collect in 4 to 6 inch pools. Rain in these depressions locally exceeds the infiltration capacity of the soils and will remain in the depressions until it infiltrates the soil or evaporates. The colloidal and fine soil particles may be: transported in runoff,

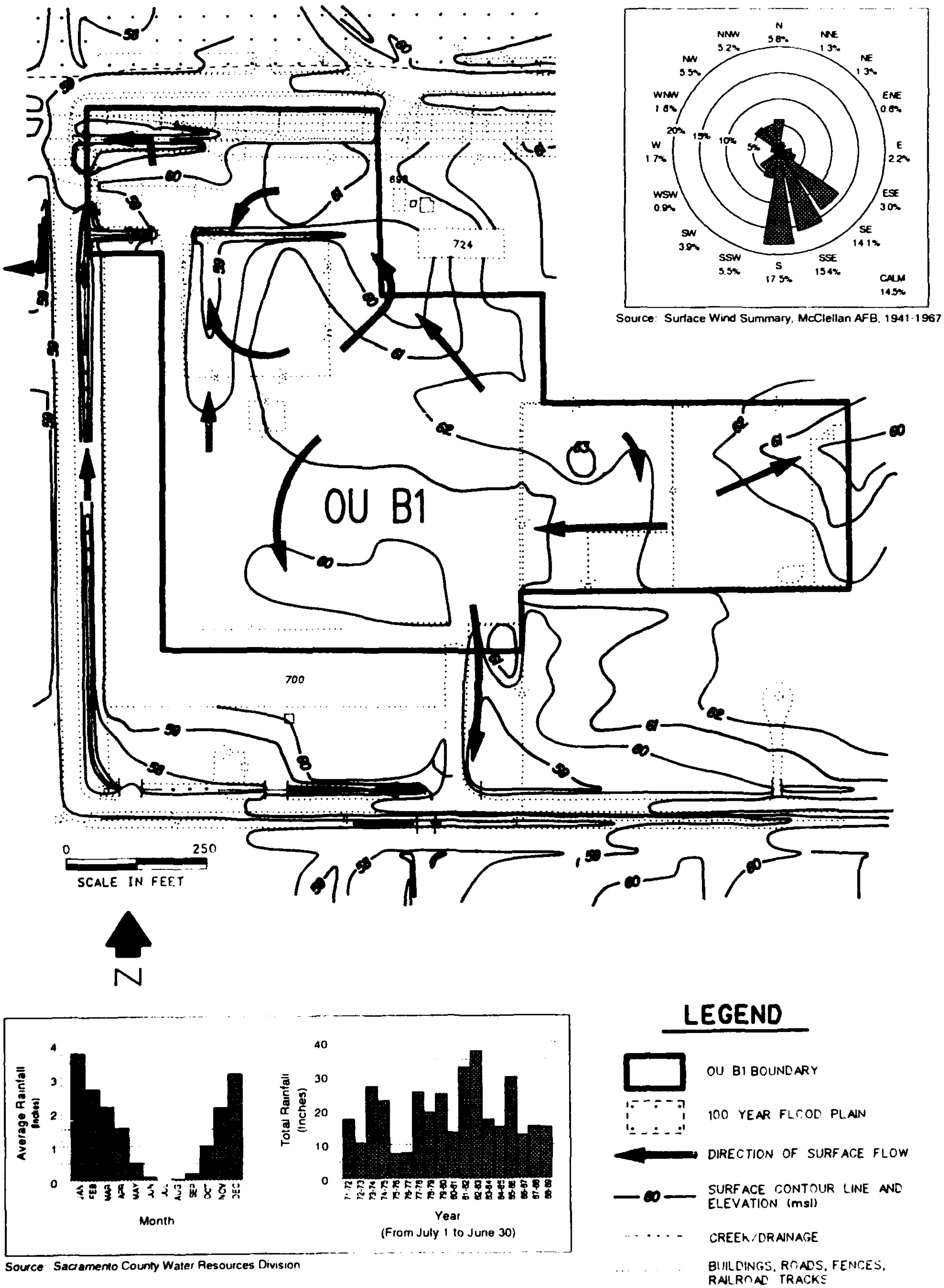


Figure 4-5. Physical Features of OU B1

deposited as dust on the PSP as water in depressions evaporates, or carried back into surface soil with infiltration. Silt- and clay-sized (2 to 10 micron), COC-contaminated particles settle out of the runoff as rainfall subsides and stream energy decreases. The finer, colloidal particles remain suspended and are transported a greater distance, reentering the soil only where the runoff collects and evaporates or infiltrates soils in the stream bed. There are data to indicate that this mechanism is active in OU B1. Analytical results from stream sediment samples collected downstream from OU B1 indicate that Arochlor 1260, dioxins, cadmium, arsenic, and lead have been transported in runoff.

The very low aqueous solubilities of organic COCs and the tendency of all COCs to adsorb to organic material suggest that the total mass of COCs transported as a dissolved aqueous phase is much less than the mass transported by colloidal or fine particle transport.

The potential for surface transport of COCs in the soils of OU B1 would be reduced if a low permeability cover were placed over contaminated soils. The placement of the cover would diminish the potential for exchange between soils and surface transport pathways.

Potential for Subsurface Transport

Subsurface transport of COCs in OU B1 is controlled by the downward migration of surface water, soil gas advection, and soil gas diffusion. Surface covering over 73% of the area of OU B1 increases rainfall runoff, decreases the average percent soil saturation, and decreases potential for downward subsurface transport of liquids containing COCs. Conversely, soil gas diffusion and advection are increased in soils with lower percent saturation because there is a greater percentage of air-filled volume through which vapors may migrate. The vapor phase of COCs in OU B1 migrate more readily through soils in the unsaturated zone when percent saturation is relatively low, and liquid phase COCs migrate more readily when percent saturation is relatively high.

Downward migration of COCs in liquids beneath most of the OU B1 area is also limited by the physical properties of surface and subsurface soils. Soil borings in OU B1 indicate that cemented hardpan and 5- to 15-foot thick silt layers impede downward migration beneath the site. A conductivity of 0 to 7×10^{-6} meters per second (m/s) has been assigned to surface soils and hardpan of the type underlying OU B1. Subsurface silt layers are estimated to have conductivities of 1×10^{-9} to 1×10^{-11} m/s under unsaturated conditions. The presence of root bores or cracks in fine-grained layers or hardpan increase soil gas permeability but increase the average water conductivity of the vadose zone to a lesser extent. Assuming a conservative average conductivity of 2×10^{-9} m/s and a potential gradient of 1, surface water carrying COCs may not reach the saturated zone (currently 105 feet below surface) within 500 years. This very slow rate of migration applies to most of the area of OU B1, where saturated conditions are unlikely to occur because surface coverings reduce infiltration and increase runoff.

In the northeastern portion of OU B1, TCE, PCE, 1,1-DCE, cis-1,2-DCE, and benzene have been reported in soil gas samples from 20 to 95 feet below surface. Results of vadose zone modeling indicate that vapor migration in soil gas will not result in detectable concentrations (with currently available methods) of VOCs in groundwater within a minimum of 30 years, if current conditions are maintained. Predictions of future migration of VOCs become increasingly less accurate over longer time intervals. Therefore, additional evaluation of VOC migration in soil gas is planned. Remedial actions for VOCs may be considered in the OU B ROD if evaluations indicate groundwater will be impacted in the future. Concentrations in soil gas will diffuse to the soil surface and be emitted to the atmosphere.

The COCs in surface and subsurface soils may dissolve, up to their aqueous solubility limit, or be suspended as colloids in rain water passing downward through the soils. On the basis of vadose zone modeling, dissolved VOCs and Arochlor 1260 will not reach the groundwater pathway in detectable concentrations within a minimum of 30 years; some COCs from OU B1 may never be detected in groundwater. The COCs that may be carried as colloidal particles are also unlikely to have any impact on the groundwater pathway beneath OU B1, if current conditions are maintained.

The enhancement of migration by cosolvency requires concentrations of 1% or more of suitable solvent. The greatest solvent concentration in soils in the area of high Arochlor 1260 concentration was 69 mg/kg of 1,2,4-trichlorobenzene. This concentration is one thousand times less than the concentration needed to increase transport of Arochlor 1260. Therefore, this mechanism has no importance in the subsurface migration of COCs to groundwater beneath OU B1.

Potential for Groundwater Transport

Groundwater beneath OU B1 is contaminated by VOCs. However, the available data indicate that the contaminants have migrated beneath the site from another location to the north. Results of subsurface modeling of organic compound migration and calculations of inorganic species migration suggest that contaminants discharged in OU B1 will not reach groundwater in measurable concentrations for 30 years or more under current site conditions. Therefore, on the basis of the available data, the groundwater pathway will not be complete for a minimum of 30 years beneath OU B1.

4.3.5 Potential Exposure Points

Surface and subsurface soils containing COCs to depths of six feet BGS are considered potential exposure points for workers or future on-site residents. (Future on-site residential use has been evaluated in the risk assessment as a hypothetical case.)

5.0 SUMMARY OF SITE RISKS

A discussion of potential adverse impacts on human health and ecological resources resulting from the OU B1 COCs follows. See Section 4.0 for a list of COCs for OU B1.

5.1 Human Health Risks

A Health Risk Assessment (HRA) was conducted to evaluate the potential present and future human health risks associated with exposure to the COCs in OU B1 soils. Results of the risk assessment serve as the rationale for the cleanup of OU B1.

The COCs used in the HRA include all chemicals detected during the RI, with the exception of chemicals whose infrequency of detection (in less than 5% of the analyses), low concentrations, or low toxicities would not result in adverse health effects.

5.1.1 Exposure Assessment

The exposure assessment identified potential exposure pathways and segments of the population that may be exposed to site-related COCs via those pathways.

Potential Human Receptors — For the last 35 years OU B1 has been used for military purposes and is expected to be used for military, industrial, or commercial purposes in the future. Access is controlled and McClellan AFB is surrounded by a high security fence. Future exposures to COCs at OU B1 are expected to be consistent with those arising from a limited access industrial setting.

Exposures to COCs from OU B1 were evaluated for the current DRMO workers on OU B1, the nearby current residents, and visitors at the site (the general public attends occasional auctions at the DRMO). Lifetime carcinogenic risks were evaluated for all receptors. Noncarcinogenic risks were evaluated for children in the current residential scenario and adults in the DRMO worker and visitor scenario. (Children are not allowed at DRMO auctions.) Site-specific information was used in evaluating current risks whenever possible.

The risk analysis also analyzed the risks which would exist if the site were developed residentially without any remediation. For this hypothetical scenario, where residential development and consequent exposures would occur at OU B1, lifetime carcinogenic risks and children's noncarcinogenic risks were evaluated. It was assumed that the residence was constructed on a one-eighth acre lot in the area of highest PCB contamination.

5.1.2 Potential Exposure Pathways

Soil, surface water and sediments, groundwater, air, and homegrown produce can serve as exposure media for the potential receptor populations.

Soil — All non-VOC COCs were reported in OU B1 soils. Three direct routes of exposure to contaminated soils were considered: ingestion, dermal contact, and inhalation of suspended particulates. Indirect exposure via homegrown produce was also evaluated.

Surface Water and Sediments — PCBs, dioxin/furans, and inorganics were reported in surface water and sediment samples on the site. Exposure to contaminated surface waters and sediments were evaluated for the hypothetical on-site residents.

Groundwater — As described in the OU B1 RI/FS Report, Section 4.3.4, vadose zone modeling results indicated that the OU B1 COCs are unlikely to reach groundwater in the next 30 years in detectable concentrations. Therefore, exposures to contaminated groundwater were not evaluated.

Air — Exposures to volatile and semivolatile COCs in soil gas can occur when contaminants are emitted into ambient air. Inhalation exposures were evaluated for all potential receptors.

Homegrown Produce — COCs in soil can be taken up by plant roots. Exposures resulting from homegrown produce consumption were evaluated for current off-base residents and the hypothetical on-site residents.

5.1.3 Exposure Assessment

Receptor populations, current and potential future site activities, and exposure pathways were integrated into exposure scenarios representing reasonable maximum exposure (RME) and average exposure conditions, enabling the evaluation of human health risks.

Four exposure scenarios were evaluated in the intake assessment. The Current Worker Scenario evaluated exposures to the workers in the DRMO yard. The Current Residential Scenario addressed potential exposures to the nearest current residents. The Current Visitor Scenario assessed exposure to on-site visitors. The Hypothetical Residential Scenario assessed hypothetical exposures to on-site residents.

Residual DRMO worker exposures after installation of a cap were evaluated in the Partial Cap and Full Cap Scenarios. The Partial Cap Scenario assumed that all areas with PCB concentrations in soil greater than 10 parts mg/kg were capped. The Full Cap Scenario assumed that all nonpaved areas in the DRMO yard were paved. With the exception of the reduced exposures caused by the cap, this scenario used the same exposure assumptions as the Current Worker Scenario. The results of these scenarios are presented in the FS.

Emissions of volatile and semivolatile COCs were obtained from the vadose zone modeling. Forklift-generated particulate emissions were calculated using a U.S. EPA traffic-generated dust model. On-site ambient air concentrations of COCs were calculated using a wind-direction sensitive version of the "box model." Off-site COC concentrations in ambient air were evaluated using U.S. EPA's "SCREEN" dispersion model.

In the DRMO worker scenarios, parameter values for skin surface area, exposure duration, and exposure location were based on information obtained from an interview with the DRMO yard supervisor.

Table 5-1 presents the parameter values used to calculate intakes for Current and hypothetical residential scenarios. Table 5-2 presents parameter values used to calculate intakes for current worker and visitor scenarios.

Tables 5-3 and 5-4 show the cancer slope factors and reference doses for each of the COCs.

TABLE 5-1. VALUES USED FOR INTAKE PARAMETERS FOR CURRENT AND HYPOTHETICAL RESIDENTIAL SCENARIOS

Parameter	Value[a]	
	Adult	Child
Body weight	70 kg[b]	16 kg[b]
Inhalation rate	20 m^3/day[b]	15 m^3/day[b]
Soil ingestion	100 mg/day[b]	200 mg/day[b]
Soil loading on skin	0.2 mg/cm^2-day (1.0)[c]	0.2 mg/cm^2-day (1.0)[c]
Exposed skin surface area	5,000 cm^2 (5,800)[c]	3,910 cm^2 [b]
Exposure duration	9 yrs (30)[b]	6 yrs[b]
Homegrown produce ingestion rate	0.041 kg/meal[d]	0.0094 kg/meal
Meals per year	1,095[b]	1,095[b]
Exposure frequency (sediment and surface water)	NA	1.25 days/yr[e]
Exposure frequency (ambient air)	24 hrs/day	24 hrs/day
Averaging time (carcinogens)	25,550 days[b]	25,550 days[b]
Averaging time (noncarcinogens)	NA	2,190 days[a]
Exposure frequency (soil ingestion, soil dermal absorption, inhalation)	350 days/yr (365)[b]	350 days/yr (365)[b]

[a] Average case values; values in parentheses were used in the RME case analysis.
[b] U.S. EPA, 1989b.
[c] U.S. EPA, 1992a.
[d] U.S. EPA 1991b.
[e] Professional estimate.

NA = Not applicable

TABLE 5-2. VALUES USED FOR INTAKE PARAMETERS FOR NON-RESIDENTIAL SCENARIOS

Parameter	Current Worker Partial Cap and Full Cap Scenarios[a]	Visitor Scenario[a]
Body Weight	70 kg[b]	70 kg[b]
Inhalation Rate	10 m^3/8 hr workday (20)[b]	20 m^3/day[b]
Soil Ingestion Rate	50 mg/8 hr workday[c] (100)[b]	100 mg/day[b]
Soil Loading on Skin	0.2 mg/cm^2-day[c] (1.0)[c]	1.0 mg/cm^2-day[c]
Exposed Skin Surface Area	1,765 cm^2 [e] (3,120)[b]	3,120 cm^2 [b]
Exposure Duration	9 years (25)[d]	30 years[b]
Exposure Frequency	8 hours/day, 5 days/ week, 50 weeks/year	8 hours/day, 26 days/year

[a] Values in parentheses were used in the RME case analysis. Only RME case was evaluated for the Visitor Scenario.

[b] U.S. EPA, 1989b

[c] U.S. EPA, 1992a

[d] U.S. EPA, 1991b

[e] Van Dyke, 1993

TABLE 5-3. CANCER POTENCY FACTORS

Chemical	Inhalation Slope Factor $(mg/kg/day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
PCBs	7.7	7.7
TCDDeq	1.5×10^{5}	1.5×10^{5}
Arsenic	1.5×10^{1}	1.7
Chromium VI	5.1×10^{2}	4.2×10^{-1}
Cadmium	1.5×10^{1}	0.0
1,1-DCE	1.75×10^{-1}	6.0×10^{-1}
PCE	5.1×10^{-2}	5.1×10^{-2}
TCE	1.0×10^{-2}	1.5×10^{-2}

1,1-DCE = 1,1-Dichloroethene
kg = Kilograms
mg = Milligrams
PCBs = Polychlorinated biphenyls
PCE = Tetrachloroethene
TCDDeq = Tetrachlorodibenzodioxin toxic equivalents
TCE = Trichloroethene

TABLE 5-4. REFERENCE DOSES

Chemical	Value (mg/kg-day)
Arsenic	3×10^{-4}
Cadmium	5×10^{-4}
Chromium III	1×10^{0}
Chromium VI	5×10^{-3}
Copper	3.7×10^{-2}
Lead[a]	
Mercury	3×10^{-4}
Molybdenum	4×10^{-3}
Selenium	5×10^{-3}
Silver	5×10^{-3}
Zinc	3×10^{-1}
PCE	1×10^{-2}
1,1-DCE	9×10^{-3}

[a] Evaluated by using California EPA's blood-lead spreadsheet (LEADSPREAD).

1,1-DCE = 1,1-Dichloroethene
kg = Kilograms
mg = Milligrams
PCE = Tetrachloroethene

California EPA's blood-lead model was used to evaluate potential adverse effects resulting from exposures to lead from the site.

This model calculates a blood lead concentration based on concentrations in soil, drinking water, and other food sources.

5.1.4 Risk Characterization

Risk characterization uses the results of the intake analysis and toxicity assessment to calculate cancer risk values and Hazard Indices (HI) (for noncarcinogens) for each of the four scenarios.

Carcinogenic Risks

Chemical-specific cancer risks were calculated by multiplying the average lifetime intake rate (Section 5.1.3) by the cancer potency value. These risks were then summed across chemicals and pathways to calculate the total cancer risk in each scenario.

Figure 5-1 shows the results of the carcinogenic risk assessment, including:

- Total excess cancer risk in each scenario and case;
- Cancer risk by COC in each scenario and case; and
- Cancer risk by pathway in each scenario and case.

The calculated RME case risks are just above the U.S. EPA acceptable risk level of 1 x 10^{-4} (40 CFR 300.430) in the Current Worker and Current Off-Site Residential Scenarios. Risks in these scenarios' average cases and in the Visitor Scenario are less than this level. The Current Off-Site Residential Scenario evaluated risks at the nearest residential area using screening-level models to calculate concentrations in ambient air and soil. If more sophisticated models had been used, the calculated risks would probably be below the acceptable level in the RME case. Risks in more distant current residential areas would be less than the acceptable level.

Risk to hypothetical on-site residents living in the worst-case location exceed the acceptable level. It is highly unlikely that anyone will experience this risk because remediation would be conducted prior to residential construction. Hypothetical residents in other areas of the site would experience risks as much as several orders of magnitude lower and possibly below the acceptable level.

Although the calculated cancer risks in the Hypothetical On-Site Scenario exceeded 1.0 (23 and 1.3 in the RME and average cases, respectively), they were reported as 1.0 because a probability cannot realistically exceed 1.0. The calculated risks are the result of the conservative nature of the calculations.

Noncarcinogenic Health Effects

The potential for adverse chronic noncarcinogenic effects were characterized by comparing the calculated intake rates (doses) to an intake rate that is considered to be the threshold for significant adverse effects in sensitive individuals (reference dose). The Hazard Quotient (HQ) is the ratio of the calculated dose to the reference dose. If a compound's HQ exceeds 1.0, there is the potential for an adverse health effect to occur. As a screening procedure (assuming that all COCs produce the same noncarcinogenic effects), HQs were summed to obtain the HI. The HI for all cases in all four scenarios are presented in Table 5-5.

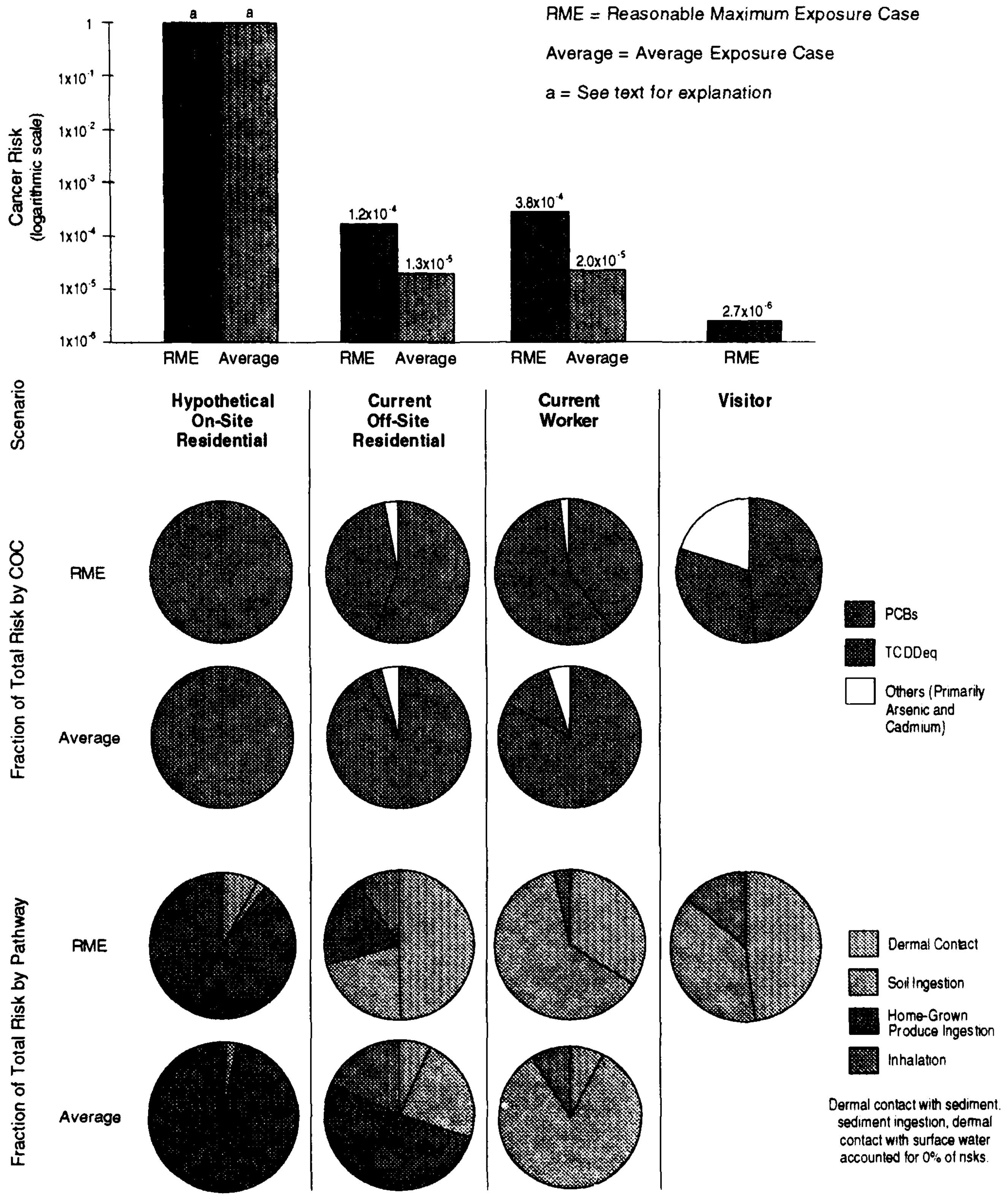


Figure 5-1. Cancer Risk Assessment Summary

TABLE 5-5. HAZARD INDICES

Scenario	Average Case	RME Case
Current Worker	0.012	0.049
Current Residential	0.29	0.61
Hypothetical Residential	1.4	1.7
Visitor	NE	0.0018

NE = Not evaluated.

If the HI is less than 1.0, chronic noncarcinogenic effects are not likely to occur. If the HI exceeded 1.0, a more refined analysis was performed to determine if noncarcinogenic effects are likely.

The results indicate that the HI is greater than 1.0 only in the Hypothetical On-Site Residential Scenario. No chemical-specific HQs exceeded 1.0 in this scenario. Using the CAPCOA (1992) procedure to evaluate organ and systemic Hazard Indices, no organ or system-specific Hazard Indices exceeded 1.0 in the RME case of this scenario.

Lead Evaluation

California EPA's (1992b) blood-lead model, which evaluates lead exposures based on a calculated blood-lead concentration, was applied in the Residential and Current Worker Scenarios. The model was run in two modes: the first only evaluated the lead exposures from OU B1; the second included the default background concentrations in air, water, and produce that are recommended by the model.

Because only one soil concentration can be entered into the model, it was conservatively assumed that produce was grown in soils with a mixing depth of 1 centimeter in the Current Off-Site Residential Scenario.

Only adult exposures were evaluated for the Current Worker Scenario. It was assumed that half of the worker's ingested lead originates from OU B1. The background soil concentrations for workers was conservatively assumed to be equal the on-site concentrations.

As shown in Table 5-6, child and adult exposures to lead from OU B1 generally resulted in blood-lead levels less than the 10 micrograms per deciliter (μg/dL) reference concentration. Only when using the residential on-site maximum concentration was the reference concentration exceeded by the child's blood-lead level.

TABLE 5-6. BLOOD-LEAD LEVELS RESULTING FROM EXPOSURES TO OU B1 SOIL

	Blood-lead levels (μg/dL)	
Scenario	Adults	Child
Current Worker	0.8	NE
Current Off-Site Residential	0.1	0.5
Hypothetical On-Site Residential (average soil concentration)	1.1	6.9
Hypothetical On-Site Residential (maximum soil concentration)	2.0	13

NE = Not evaluated.

Reference concentrations = 10 μg/dL

5.2 Ecological Evaluation

In a preliminary ecological survey (U.S. EPA, 1993) of McClellan AFB, four sensitive habitats were identified: Don Julio Creek and adjacent grasslands with vernal pools, the Western Collection Ponds, Magpie Creek, and Robla Creek.

In addition, the burrowing owl, designated a "species of special concern" by the California Department of Fish and Game, was identified at McClellan AFB. The locations of these significant ecological resources and ecological resources in adjacent off-base areas wer. not addressed.

No significant ecological resources in OU B1 were specifically identified in the U.S. EPA report (1993). Most of this highly developed area is covered with perforated steel planking, buildings, and asphalt. Vegetation or wildlife food sources are essentially nonexistent except in the grass areas between the DRMO and CE yards. The only wildlife that may be present at the DRMO are small mammals and birds that are typically found in non-natural areas. The drainage ditches from the DRMO yard may occasionally be used by wildlife as a water source but their importance is minimized by fences restricting access and the ephemeral nature of the drainages. Some sections of these ditches contain small patches of grasses and weedy plant species, but are not considered to be a useful ecological resource. Evidence of burrowing owl habitat, however, has been observed in some drainage ditch locations.

Potential Exposure Pathways

Magpie Creek is the primary ecological resource that could be significantly affected by contaminants at OU B1. The temporary plastic liner that was recently installed at the DRMO should significantly reduce the amount of PCBs and dioxins that could run off into these ditches. The more permanent, low permeability cap, described in Section 6.0, would reduce contaminant runoff even further.

Burrowing owls could also be affected by the OU B1 contamination if they inhabit the grassy area between the storage yards, the grassy fields immediately south of OU B1, or the drainage ditches. Although this is not the primary burrowing owl habitat on base, the recommended burrowing owl census (U.S. EPA, 1993) would determine if the owls occur in this area. The potential exposure pathways would be direct contact with soil, ingestion of contaminated food (primarily insects), and inhalation of vapors in burrows and ambient air. Potential exposures to contamination at PRL-29 would be virtually eliminated if the contaminated soils are excavated and buried beneath the low permeability cap.

6.0 DESCRIPTION OF ALTERNATIVES

The remedial action goals for the McClellan AFB OU B1 site are:

1) Protect human health and the environment;

2) Meets ARARs;

3) Keep the DRMO in operation; and

4) Expedite the cleanup of OU B1.

The specific remedial action objectives derived from these goals are identified in Table 6-1. The goals and specific remedial action objectives were used to identify and evaluate alternatives for OU B1.

The Air Force evaluated seven alternatives in selecting the final cleanup plan for the McClellan AFB OU B1 site. Figure 6-1 summarizes the seven alternatives that were developed. The seven alternatives are:

- Alternative 1 — No Action;
- Alternative 2 — Capping;
- Alternative 3 — Excavate, Off-Site Disposal, and Paving;
- Alternative 4 — Excavate, Off-Site Incineration, Disposal of Residuals, and Paving;
- Alternative 5 — Excavate, On-Site Treatment, Disposal of Residuals, and Paving;
- Alternative 6 — Capping and Treatability Studies with On-Site Treatment Potential; and
- Alternative 7 — Excavate Hot Spots, Off-Site Disposal and Capping.

These alternatives were developed from an evaluation that began by setting cleanup objectives, and included studying the universe of applicable response actions and technologies that might address the OU B1 site contamination. This evaluation and screening process is documented in detail in the FS.

Alternative 1 is the "no action" alternative. Alternative 2 includes capping the site to contain all contaminants. Alternatives 3, 4, and 5 include removal and disposal or treatment of contaminants through off-site disposal in a landfill, off-site incineration, and on-site treatment, respectively. Alternative 6 is a hybrid of the capping and on-site treatment alternatives, although the treatment aspect depends upon the results of treatability studies. Alternative 7 includes excavation of the PCB hot spots (greater than 500 mg/kg) for off-site disposal and then capping the entire site. Alternative 3 through 7 also include paving the site with asphaltic concrete after the primary remedial actions are taken to contain any remaining contaminants and to keep the DRMO operational.

The primary COCs for OU B1 soils and sediment are PCBs and dioxins. Secondary COCs include metals in soil and VOCs in soil gas (see Section 4.0 for list of COCs). The FS addresses primary COCs, though the effects of alternatives on secondary COCs, which may be addressed under other CERCLA

TABLE 6-1. SPECIFIC REMEDIAL ACTION OBJECTIVES FOR OU B1

- Prevent contaminant exposure to the public and the environment through the protection of groundwater, surface water, air, and direct contact pathways.

- Reduce the site's cancer risk to less than 1×10^{-6}, and reduce the noncarcinogenic Hazard Index to less than one.

- Meet ARARs.

- Remediate soils containing >10 mg/kg PCBs from the surface to 3 feet BGS, >100 mg/kg PCBs for soils >3 feet BGS, and >1 μg/kg dioxin/furan (2,3,7,8-TCDD equivalent).

- Remediate drainage sediments to the extent that one of the following is met: contaminant concentrations in sediments are equal to or less than background levels; excess cancer health risk is less than 1×10^{-6}; or noncarcinogenic Hazard Index is less than 1.

- Select alternatives that include treatment, where applicable and practicable, particularly for principal threats, i.e., for soils containing >500 mg/kg PCBs.

- Contain soils that pose a long-term threat where treatment is not practicable.

- Prevent the migration of contaminated soil particles to OU B1 ditches and Magpie Creek.

- Ensure that discharges from OU B1 ditches cannot cause the receiving water to exceed any of the listed concentrations in the California Inland Surface Waters Plan or McClellan AFB stormwater discharge permit.

- For capping alternatives, cap must:
  — Hold up under current DRMO operations;,
  — Allow minimal rainwater infiltration;
  — Have a design life span of 30 years;
  — Allow for potential future treatment of PCB principal threats;
  — Prevent erosion of soil beneath cap; and
  — Be maintained throughout its design life to eliminate direct contact and inhalation pathways.

- Optimize cost/risk reduction quotient.

- Include potential for "dual track" remediation (i.e., perform expedited remedial action now and continue to evaluate options to further remediate contaminated soil in future).

- Implement institutional controls to 1) ensure land use will remain industrial; and 2) mitigate short-term impacts and/or 3) supplement engineering controls.

- Consolidate contaminated soils and sediment from discrete areas (PRL 29, PRL 50, drainage ditches) at OU B1 to optimize remediation.

- Reduce potential for VOC migration and construct wells to monitor VOCs in soil gas, and in the OU B ROD, consider remedial actions to reduce the potential for VOC impacts on groundwater.

ARARs	=	Applicable or Relevant and Appropriate Requirements.
DRMO	=	Defense Reutilization and Marketing Office.
PCBs	=	Polychlorinated biphenyls.
2,3,7,8-TCDD	=	2,3,7,8-Tetrachlorodibenzo-p-dioxin.
mg/kg	=	Milligrams per kilogram.
μg/kg	=	Micrograms per kilogram.

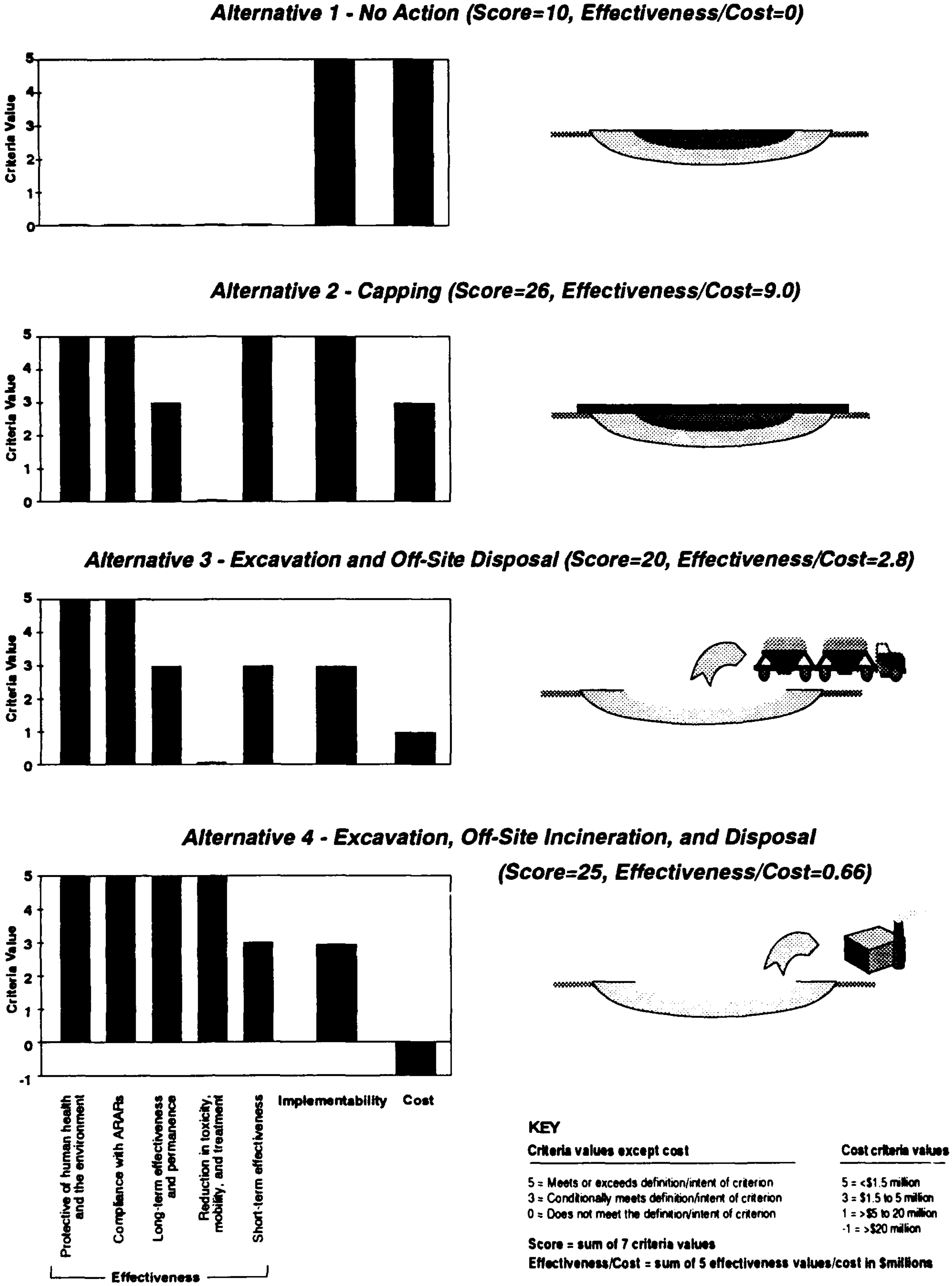
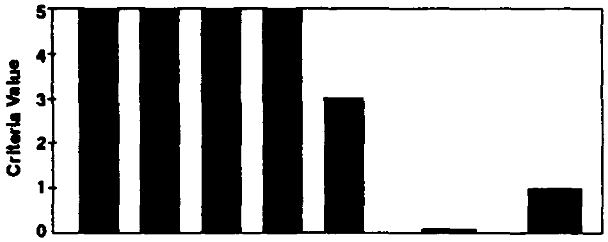
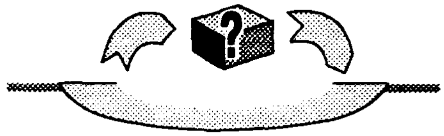


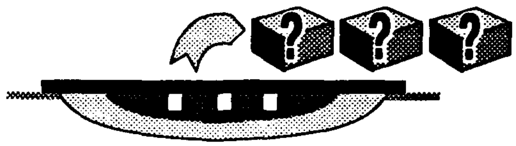
Figure 6-1. Comparative Analysis of Remedial Alternatives

Alternative 5 - Excavation, On-Site Treatment, and Disposal (Score=24, Effectiveness/Cost=1.2)

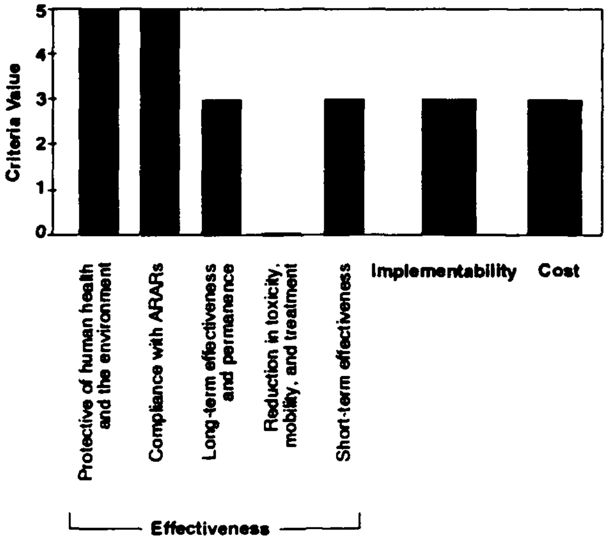


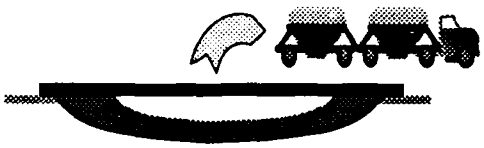


Alternative 6 - Capping and Treatability Studies with Potential On-Site Treatment (Score=26, Effectiveness/Cost=6.9)



Alternative 7 - Excavation and Disposal of Principal Threat and Capping the Site (Score=22, Effectiveness/Cost=4.2)





KEY

Criteria values except cost	**Cost criteria values**
5 = Meets or exceeds definition/intent of criterion	5 = <$1.5 million
3 = Conditionally meets definition/intent of criterion	3 = $1.5 to 5 million
0 = Does not meet the definition/intent of criterion	1 = >$5 to 20 million
	-1 = >$20 million

Score = sum of 7 criteria values
Effectiveness/Cost = sum of 5 effectiveness values/cost in $millions

Figure 6-1. (Continued)

actions, were considered. The primary media of concern are soils and drainage ditch sediments. The exposure pathways that pose the greatest contribution to total risk are soil ingestion and dermal contact with contaminated soils.

6.1 Interim Cleanup Goals for OU B1

The principal cleanup goal for OU B1 is the reduction of OU B1's excess cancer risk to less than 10^{-6} and reduction of the noncarcinogenic hazard index (HI) to less than one, or to at least meet ARARs and/or TBCs.

The key Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBCs) requirements considered in this action are as follows:

- Toxics Substances Control Act (TSCA);
- Resource Conservation and Recovery Act (RCRA);
- OSWER Directive No. 9355.4-01 (the "U.S. EPA PCB Cleanup Guidance" [U.S. EPA, 1990]);
- California Code of Regulations, Title 23, Division 3, Chapter 15; and
- California Inlands Surface Water Plan.

All of the above are ARARs except the OSWER Directive, which is a TBC.

Interim cleanup goals or the logic for determining the cleanup standards are presented in this section by medium and contaminant type. A summary of interim cleanup standards summarized for soil, surface water, and sediment in Table 6-2.

6.1.1 Soil and Stream Sediment

PCBs — Cleanup standards have been set at 10 mg/kg for soils from 0 to 3 feet BGS and 100 mg/kg for soils and sediment greater than 3 feet BGS. This is consistent with soil cleanup standards for PCB spills at industrial facilities as described in the *Guidance on Remedial Actions for Superfund Sites With PCB Contamination* (Oswer Directive No. 9355.4-01, August 1990).

An interim cleanup standard for PCB in drainage sediments has not been determined; however, it will be based on a PCB concentration that either: is equal to a background concentration in sediments; results in 10^{-6} or less excess carcinogenic risk to receptors; results in an HI less than 1.0; or has no potential to adversely impact downstream ecologic receptors.

Dioxins and Furan Compounds — The cleanup standard has been set at 1 μg/kg of Tetrachlorodibenzodioxin equivalents (TCDDeq) using I-TEFs for all soil and sediment. This cleanup standard is based on approved dioxin cleanup standards at similar Superfund sites.

Inorganic Species — Cleanup standards for inorganic species have not been established for OU B1. Figure 6-2 presents the decision logic that will be used to select cleanup standards for the inorganic species of concern at OU B1. The cleanup standard for individual inorganic species will be based on the concentration of the species that either: is equal to background concentration in surface, subsurface, or sediments; results in 10^{-6} or less

TABLE 6-2. INTERIM CLEANUP STANDARDS

Media	COC	Cleanup Levels	General Response Action	Comment
Surface Soil (0-3) feet BGS)	PCBs	10 mg/kg	No Action Institutional Control	Cleanup level based on Guidance on Remedial Actions for Superfund Sites with PCB contamination[a]
	Dioxin and furans	1 μg/kg TCDDeq[b]	Containment	Cleanup level based on approved dioxin clean-up levels at similar sites.
	Inorganics	To be determined	Excavate and dispose Excavate, treat, and dispose In-situ treatment	Inorganic cleanup levels will be established using the decision logic shown on Figure 6-2. The cleanup level will be based on a 10^{-6} cancer risk, an HI <1, or surface soil background concentrations.
Subsurface Soil (>3 feet BGS)	PCBs	100 mg kg	Same as above.	Cleanup level based on Guidance on Remedial Actions for Superfund Sites with PCB contamination[a]
	Dioxin and furans	1 μg/kg TCDDeq[b]		Cleanup level based on approved dioxin clean-up levels at similar sites.
	Inorganics	To be determined		Inorganic cleanup levels will be established using the decision logic shown on Figure 6-2. The cleanup level will be based on a 10^{-6} cancer risk, an HI <1, or subsurface soil background concentrations.
Stream Sediment	PCBs	To be determined	Same as for soil.	PCB cleanup levels will be established using the decision logic shown on Figure 6-2. The cleanup level will be based on a 10^{-6} cancer risk, an HI <1, or sediment soil background concentrations.
	Dioxin and furans	1 μg/kg TCDDeq[b]		Cleanup level based on approved dioxin clean-up levels at similar sites.
	Inorganics	To be determined		Inorganic cleanup levels will be established using the decision logic shown on Figure 6-2. The cleanup level will be based on a 10^{-6} risk, a HI <1, or sediment soil background concentrations.

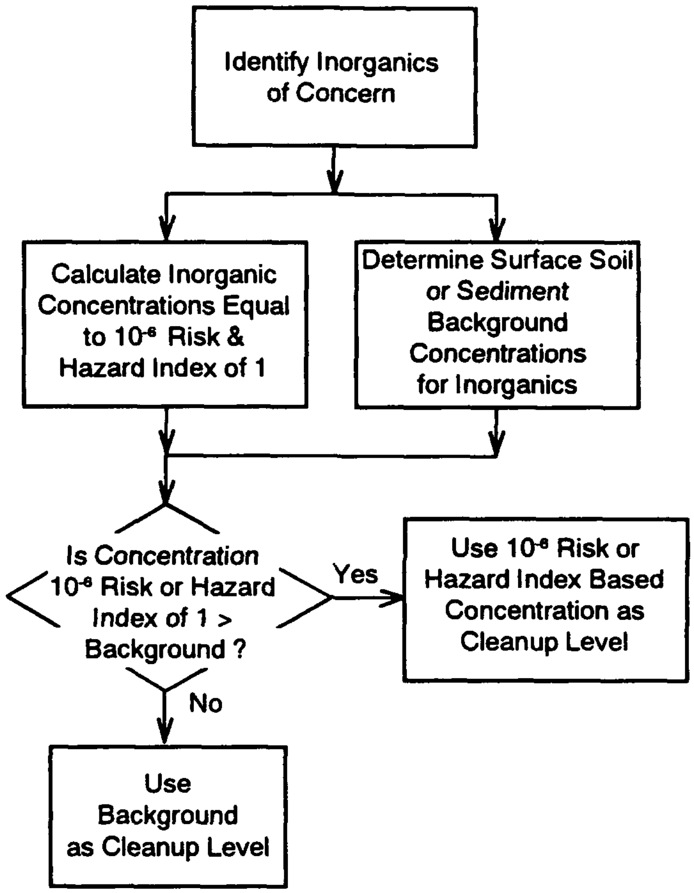
(Continued)

TABLE 6-2. (Continued)

Media	COC	Cleanup Levels	General Response Action	Comment
Surface Water	PCBs; dioxins and furans;inorganics	Varies	Same as for soil.	Discharges from OU B1 ditches cannot cause receiving waters to exceed criteria established in the California Inlands Surface Water Plan and McClellan AFB Storm Water Discharge Permit. A monitoring program will be established to confirm this.
Groundwater	PCBs; dioxins and furans	None identified.	None.	No remediation goals will be developed for groundwater. Soil gas and groundwater monitoring will be conducted under a documented program. The need for remedial action for groundwater impacts from OU B1 sources will be considered in the OU B RI/FS and ROD. Modeling has indicated that PCBs and dioxins will not impact groundwater beneath OU B1 within 30 years.

[a] Based on OSWER Directive No. 9355.4-01 (U.S. EPA), 1990.
[b] The 1 μg/kg concentration is the sum of all dioxin and furan isomers, reported as a 2,3,7,8-TCDD-equivalent concentration.

BGS = Below ground surface
COC = Contaminant of concern
mg/kg = Milligram per kilogram
PCB = Polychlorinated biphenyls
TCDDeq = TCDD equivalents
μg/kg = Microgram per kilogram



NOTE: Risk concentrations based on Current Worker Scenario

Figure 6-2. Inorganic Cleanup Standard Determination for OU B1 Surface Soils and Sediments

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excess risk to receptors; results in an HI less than 1.0; or has no potential to impact ecologic receptors.

6.1.2 Surface Water

Specific cleanup standards are not established for surface water in OU B1 drainage ditches. Any discharges of contaminated surface water from OU B1 must, however, comply with the overall guidance in the:

> *California Inland/Surface Water Plan (ISWP [SWRCB 1991]).* Discharges from the OU B1 ditches cannot cause the receiving waters to exceed any of the listed concentrations (Tables 6-3A and B).
>
> *McClellan AFB storm water discharge permit (National Pollution Discharge Elimination System [NPDES] No. CA0004359).* Discharge from the OU B1 ditches must comply with the NPDES permit and not cause exceedances of water quality objectives.

The soil, sediment, and surface water cleanup standards were selected based on protectiveness criteria and the requirements of law.

6.2 Stream Sediment Remedies

Operable Unit B1 ditches contain contaminated soil particles that were transported with surface water runoff from the DRMO storage yard. Because the origin of the contamination was the DRMO storage yard, any contaminated sediments requiring remediation will be brought back to the DRMO and consolidated with OU B1 soils.

The decision logic that will be used to select the remedy for contaminated stream sediments is shown in Figure 8-1. Any contaminated sediment concentrations greater than the cleanup standards will be dredged and combined with OU B1 soils for remediation.

6.3 Surface Water Remedies

Any remedial actions taken at OU B1 will be designed to prevent contaminated sediment from being transported via surface water off OU B1. Any actions taken in ditches will be conducted to limit ecologic impacts in the ditches and downstream. Surface water concentrations should be monitored to determine if surface water runoff from OU B1 will cause exceedance of the ISWP and NPDES permit for McClellan AFB. Surface water, cap integrity, drainage channel liner, vadose zone, and groundwater monitoring plans will be developed and submitted to regulatory agencies for approval.

6.4 Soil Remedies

The seven remedial alternatives selected for detailed analysis in the FS are described and evaluated in this section. Contaminated stream sediments above cleanup standards will be consolidated with OU B1 soils prior to remediation.

The extent of PCB-contaminated sediment, surface water, and soil are based on RI sampling results (see Section 2.0). Table 6-4 summarizes the area and volume of PCB-contaminated soils and sediments in OU B1.

TABLE 6-3A. RECEIVING WATER LIMITATIONS FROM THE INLAND SURFACE WATERS PLAN: PROTECTION OF AQUATIC LIFE

Constituent	Unit	4-Day Average	Daily Average	1-Hour Average	Instantaneous Maximum
Arsenic	µg/L	190	—	360	—
Cadmium	µg/L	b	—	b	—
Chromium (VI)[a]	µg/L	11	—	16	—
Copper	µg/L	c	—	c	—
Lead	µg/L	d	—	d	—
Mercury	µg/L	—	—	2.4	—
PCBs*	ng/L	—	14	—	—
Selenium	µg/L	5.0	—	20	—
Silver	µg/L	—	—	—	e
Zinc	µg/L	f	—	f	—

* See Appendix 1 in the Inland Surface Waters Plan for definition of terms.

[a] Discharges may, at their option, meet this limitation as total chromium.

[b] 4-Day Average cadmium, $e^{0.7852H - 3.490}$; 1-Hour Average cadmium, $e^{1.128H - 3.828}$. For example, where hardness is 50 mg/L, the 4-Day Average cadmium = 0.66 µg/L and the 1-Hour Average cadmium = 1.8 µg/L.

[c] 4-Day Average copper = $e^{0.8545H - 1.465}$; 1-Hour Average copper = $e^{0.9422H - 1.464}$. For example, where hardness is 50 mg/L, the 4-Day Average copper = 6.5 µg/L and the 1-Hour Average copper = µg/L.

[d] 4-Day Average lead = $e^{1.273H - 4.705}$; 1-Hour Average lead = $e^{1.273H - 1.460}$. For example, where hardness is 50 mg/L, the 4-Day Average lead = 1.3 µg/L and the 1-Hour Average lead = 34 µg/L.

[e] Instantaneous Maximum silver = $e^{1.72H - 6.52}$. For example, where hardness is 50 mg/L, Instantaneous Maximum silver = 1.2 µg/L.

[f] 4-Day Average zinc = $e^{0.8473H + 0.7614}$; 1-Hour Average zinc = $e^{0.8473H + 0.8604}$. For example, where hardness is 50 mg/L, the 4-Day Average zinc = 59 µg/L and the 1-Hour Average zinc = 65 µg/L.

TABLE 6-3B. RECEIVING WATER LIMITATIONS FROM THE INLAND SURFACE WATERS PLAN: PROTECTION OF HUMAN HEALTH

	Existing or Potential Sources of Drinking Water		Other Waters	
Constituent	Unit	30-Day Average	Unit	30-Day Average
Noncarcinogens**				
Cadmium	µg/L	10	—	—
Chromium (VI)[a]	mg/L	0.05	—	—
Copper	µg/L	1,000.0**	—	—
Lead	µg/L	50.0	—	—
Mercury	ng/L	12	ng/L	12
Selenium	µg/L	10	—	—
Silver	mg/L	0.05	—	—
Zinc	mg/L	5.0**	—	—
Carcinogens**				
Arsenic	µg/L	5.0	—	—
Benzene	µg/L	0.34	µg/L	21
PCBs*	pg/L	70	pg/L	70
TCDD* equivalents	pg/L	0.013	pg/L	0.014

[a] Dischargers may, at their option, meet this limitation as total chromium.

* = See Appendix 1 in the Inland Surface Waters Plan for definition of terms.
** = Taste and/or odor-based objectives.
mg/L = Milligram(s) per liter; µg/L = microgram(s) per liter.
pg/L = Picogram(s) per liter; "—" = not applicable.

TABLE 6-4. AREA AND VOLUME CALCULATIONS FOR PCB-CONTAMINATED SOIL AT OU B1

Area of Interest	Areal Extent (ft^2)	Depth of Contamination (ft)	Volume (cubic yards)	Volume Plus 15% Swell Factor (cubic yards)
PCBs >500 mg/kg	12,000	7	3,111	3,578
PCBs >100 mg/kg	18,800	1.5-7	3,826	4,400
PCBs 10-500 mg/kg	124,000	1.5	6,889	7,922
Drainage ditches (4,775 feet long[a])	27,050	1	1,002	1,152
TOTAL Volume:				12,652

[a] Width varies from 4 feet to 7 feet.

mg/kg = Milligrams per kilogram

6.4.1 Alternative 1 — No Action

Description — The no action alternative represents a baseline against which the other alternatives can be compared. It relies on natural physical, chemical, and biological processes to reduce contaminant concentrations over an extended period of time. No containment, disposal, or treatment process options are included in this alternative; however, long-term monitoring is included.

Evaluation — Airborne emissions and the dermal contact pathway are not eliminated, and surface water impacts are still possible without engineered controls. However, the existing fencing, PSP, and 45-mil HDPE liner will reduce the potential for dermal contact, fugitive emissions, and surface water runoff from the areas of highest PCB concentrations.

The alternative fails to comply with ARARs and also fails to protect human health and the environment. Toxicity or mobility of the contaminants is not reduced because no treatment is performed. Potential short-term exposures resulting from disturbances of contaminated soils will not occur. However, the alternative offers no short-term benefit to human health or the environment. The alternative will also restrict DRMO operations because of the existing HDPE liner over the PCB hot spot and the fence surrounding it.

The long-term monitoring (30 years) would cost approximately $23,000 annually with a present value of approximately $400,000 ($25/ton). The cost estimate is assumed to be accurate within -30% to +50 percent.

6.4.2 Alternative 2 — Capping

Description — This alternative involves the installation of an asphaltic concrete cap over all soils contaminated above the cleanup standards. It closes several migration pathways to reduce risks to human health and the environment, and allows natural physical, chemical, and biological processes to achieve the cleanup standards.

Evaluation — Capping protects human health and the environment by creating a barrier that reduces surface water infiltration, prevents soil ingestion, dermal exposure, and inhalation of contaminated dust. Migration of contaminants from OU B1 in surface water is eliminated. Capping is a proven, widely-applied technology. The alternative addresses all potential contaminants at OU B1.

To comply with ARARs, the cap must prevent migration of contaminants to groundwater (U.S. EPA PCB guidance [U.S. EPA, 1990]). Site-specific modeling indicates that PCBs and dioxins will not migrate to groundwater, even without a cap.

A cap must be maintained and periodically repaired. Failure of the cap could result in ingestion or dermal contact of contaminated soil, inhalation of contaminated dust, increased surface water infiltration, and surface water transport of contaminated soil particles. With maintenance, this alternative is effective long term. The use of the site would have to be restricted to activities compatible with the materials and design of the cap, such as an open area, storage, or parking. Monitoring of the cap, surface water, liner vadose zone, and groundwater to assure long-term effectiveness of the alternative would be documented in an operations and maintenance plan prepared prior to construction of the cap.

No treatment is performed; therefore, the toxicity, mobility, and volume of contaminated soil are not reduced. Because no excavation would occur, there is little potential for short-term exposure to contaminated dust and gas-phase contaminants. A cap is very effective in the short term, eliminating exposure pathways and protecting human health and the environment.

This alternative would have a relatively small, short-term impact on DRMO operations. When completed, capping would have no long-term effect on DRMO operations. The time needed to complete the cap is estimated to be approximately three months.

A conceptual cap design is shown in Figure 6-3. OU B1 will be capped in unpaved areas where PCB, dioxin and furan, and inorganic concentrations exceed the cleanup standards; however, partially capping OU B1 would impact DRMO operations. A continuous asphaltic concrete covering over all exposed soil surfaces in OU B1 would have the least impact on the operations. Therefore, if the capping alternative is selected, a cap over the entire OU B1 area would be constructed. Existing paving overlying soils exceeding cleanup levels would be upgraded to at least the standards of the new cap and would be included in the capping monitoring program.

The estimated cost (within -30% to +50%) to implement this alternative is $2.2 million ($127/ton), including the present value of long-term monitoring.

6.4.3 Alternative 3 — Excavation and Off-Site Disposal

Description — For this alternative, approximately 12,000 cubic yards of soil and sediments containing contaminants greater than the cleanup standards would be excavated and loaded into transport vehicles, weighed to ensure compliance with Department of Transportation (DOT) load requirements, properly manifested, and transported to a TSCA-permitted hazardous waste disposal facility to be stabilized and stored. Clean soil would be backfilled to restore the original grade of the site and all unpaved areas would be paved to allow DRMO operations to continue.

Evaluation — The alternative could be implemented quickly using standard construction equipment and techniques. The excavated materials would be isolated in a permitted landfill, thereby reducing the contaminant exposure pathways. Soils contaminated with both metals and semivolatile or nonvolatile organic compounds may be treated

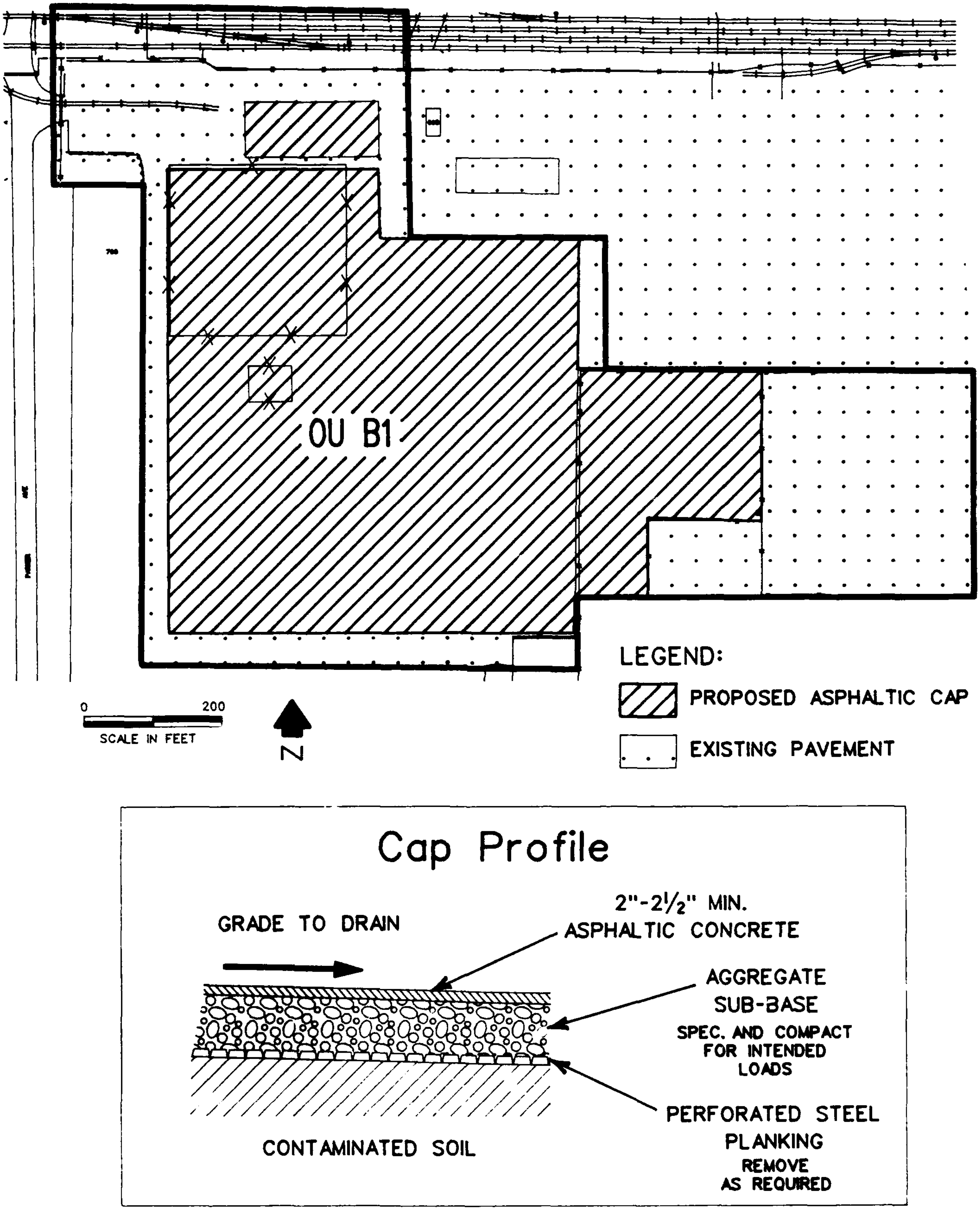


Figure 6-3. Conceptual Design of the Capping Alternative

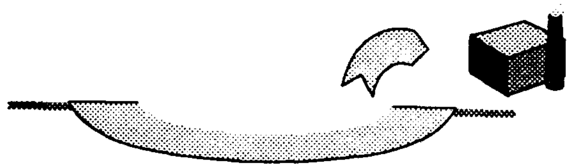
in one step. Additives and reagents are widely available and relatively inexpensive.

Excavation activities would have significant potential to release dust-borne and airborne contaminants to be spread by winds when the soils are disturbed, thereby increasing the risk of exposure for the construction workers and nearby community. The PSP must be removed and decontaminated to implement this alternative; this could also create short-term exposure risks to workers. The alternative must meet Sacramento Metropolitan Air Quality Management District (SMAQMD) air quality requirements and TSCA landfill requirements. Soils that have Toxicity Characteristic Leaching Procedure (TCLP) concentrations exceeding RCRA Land Disposal Restrictions (LDRs) would have to be stabilized at the Class I site prior to landfilling, thereby significantly increasing costs. This alternative would not be implemented due to LDRs if both TCLPs are exceeded and halogenated organic compounds (HOCs) (including PCBs) are greater than 1,000 mg/kg. Because landfilling does not reduce the toxicity, mobility, or volume of the contaminants, the objective for permanent solutions involving treatment will not be met. The long-term effectiveness depends on continued careful operation and maintenance of the landfill by its operator. Failure of containment at the disposal facility could affect groundwater and surface water quality, result in dermal contact, or inhalation of the contaminants at the disposal facility. Currently, only Kettlemen Hills is permitted to accept this waste in California. New regulations may eliminate acceptance of PCB-contaminated soils at this landfill.

Excavation and disposal would have a short-term impact on DRMO operations. Activities at the DRMO would have to be temporarily restricted while excavation took place, backfill was placed and compacted, and the DRMO yard was paved. The work schedule is estimated to be six months. Concerns related to equipment decontamination would reduce implementability; the removal and decontamination of the PSP also increases the difficulty and cost of implementing this alternative.

The estimated cost (within -30% to +50%) to implement this alternative is approximately $5.6 million ($349/ton).

6.4.4 Alternative 4 — Excavation, Off-Site Incineration, and Disposal



Description — Approximately 12,000 cubic yards of contaminated soil and sediment would be excavated and transported to an off-site facility for organic chemical and stabilization of metals contaminant destruction. Incineration in a TSCA-permitted incinerator has been selected as representative of the applicable treatment process options. Treated soils will require stabilization prior to disposal in a landfill. Clean soil would be brought to OU B1 and backfilled. It would also be paved to keep DRMO operational.

Evaluation — Implementation of this alternative would destroy the PCBs, dioxins, and furans permanently reducing their toxicity, mobility, and volume. The alternative could be implemented relatively quickly using proven excavation and incineration techniques.

The inorganic residuals will contain concentrations of metals that would make it necessary to stabilize and then dispose of the residual in a hazardous waste landfill. No long-term operation or maintenance is expected for this alternative.

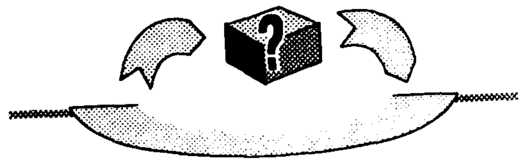
The alternative meets ARARs for soil treatment of PCB and dioxin contamination; however, SMAQMD air quality requirements for excavating the soils must be met. A landfill disposal facility for incinerator ash would be selected in accordance with the RCRA/TSCA regulations.

Excavation activities would have the significant potential to release dust-borne and airborne contaminants to be spread by winds when the soils are disturbed, increasing the risk of exposure for the construction workers and nearby community. Although incineration is a proven and reliable method for destroying organic contaminants such as PCBs and dioxins, very few commercial facilities will accept wastes with these contaminants. There is also uncertainty that an approved facility can incinerate the dioxin-containing soil. Therefore, the implementability of this alternative is very low.

This alternative has approximately the same impact on the DRMO as the excavation and disposal alternative. The schedule is estimated to be 12 months to allow for selecting a facility, a possible trial burn, excavation, and off-site transportation.

The estimated costs (within -30% to +50%) to implement this alternative is approximately $35 million ($2,156/ton).

6.4.5 Alternative 5 — Excavation, On-Site Treatment, Disposal



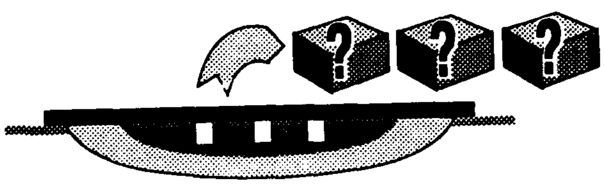
Description — This alternative consists of excavation and on-site treatment of approximately 12,000 cubic yards of contaminated soil and sediment. For costing purposes, it was assumed that a temporary incinerator meeting TSCA requirements would be brought on site for the duration of treatment. Contaminated soil would be excavated and processed through the incinerator; the resulting treated soil would be stabilized and backfilled on site. The site would then be paved to keep DRMO operational. All combustion gases would be collected and treated to SMAQMD emission standards. This alternative includes destruction of contaminants to achieve cleanup standards.

Evaluation — This alternative is similar to the off-site treatment alternative, except that all processes are performed on site and treated soil is backfilled at the site. However, any soil which exceeds TCLP limits for metals must be transported to a Class I site for stabilization to meet LDRs prior to landfilling. All of the same negative factors of alternatives 3 and 4 involving excavation would be present. The alternative must meet chemical-specific ARARs and action-specific ARARs for treatment of soil for PCBs and dioxins. The alternative must also meet incinerator performance standards. The representative technology (incineration) is available and implementable. However, because of the dioxin contamination, there is significant uncertainty that approvals could be obtained to conduct either the on-site trial burns or long-term operation. Treated soils will contain metals that will require stabilization prior to use of this material as backfill.

This alternative would affect the DRMO to a greater extent than the excavation and disposal alternatives because the work schedule is estimated to be 24 months to accommodate treatability studies, on-site trial burn, permitting, a relatively slow soil throughput for treatment, and paving.

The estimated cost (within -30% to +50%) to implement this alternative is $19 million ($1,175/ton).

6.4.6 Alternative 6 — Capping and Treatability Studies with Potential On-Site Treatment



Description — This alternative involves implementing Alternative 2 along with a commitment to continue evaluation of on-site treatment technologies. Risk will be reduced quickly by installation of a cap installation to eliminate surface exposure routes, and the *reduction in toxicity* and volume will be evaluated through treatability studies. Evaluation of potential treatment technologies will involve bench-scale and/or pilot-scale testing with soil from OU B1.

Potential treatment technologies, bench-scale, and/or pilot-scale treatability studies must meet the following performance criteria to be evaluated further for OU B1:

- The ability to initially achieve a PCB cleanup level of less than 500 mg/kg with a further reduction to 10 mg/kg possible;
- The treatment technology will be able to destroy contaminants leaving less than 10% of the original contaminant mass as a by-product; and
- The ability to achieve a cleanup level of less than 1 µg/kg for TCDDeq.

An annual report will also be prepared to document any results of treatability studies performed, new technology review, and recommendations for future treatability studies or selection of a treatment process for OU B1 soils.

Evaluation — The potential on-site treatment technologies that have been identified for continued evaluation include the following:

- **High Temperature Thermal Oxidation** is the combustion of organic materials to produce carbon dioxide and water, which leave the process as flue gas, and ash residues derived from the noncombustible material in the soil matrix.
- **Base Catalyzed Decomposition Process** dechlorinates hydrocarbons, including PCBs and dioxin/furan compounds. The process replaces the

chlorine ions with hydrogen, producing biphenyl and sodium chloride. Key variables in the reaction are temperature, base catalyst (i.e., sodium hydroxide) concentration, and hydrogen donor concentration.

- **Gas-Phase Thermo-Chemical Reduction** destroys chlorinated hydrocarbons such as PCBs, dioxins, and chlorinated pesticides. This process uses a proprietary soil/contaminant separation process, followed by reduction of the separated contaminant phase, in a thermal reactor in the presence of hydrogen (reducing agent).

- **Solvated Electron Solution Dehalogenation** selectively converts halogenated organic compounds, such as PCBs, to metal-halide salts and organic residuals. Contaminated soil is washed first with anhydrous ammonia to solubilize halogenated and nonhalogenated contaminants. Calcium metal is then used as the solvating agent to destroy halogenated compounds. Nonhalogenated compounds are recovered from the ammonia solution for separate treatment and/or disposal.

- **Solvent Extraction** is a type of soil washing technology utilizing a solvent as the contact medium to remove the COCs from the soil and concentrate them in a liquid phase. Various solvents can be used (e.g., triethylamine or propane). This process produces a liquid phase containing the COCs that require further treatment.

- **Thermal Desorption** utilizes a rotary kiln to thermally desorb the hydrocarbon from the soil matrix. Light and heavy hydrocarbons are separated; the light hydrocarbons are recycled to the process as combustion fuel, and the heavy hydrocarbons containing the COCs are collected as an oil by-product. The oil by-product requires additional treatment.

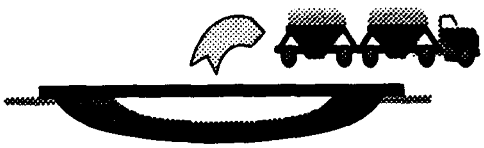
- **In Situ Biodegradation** utilizes indigenous microbes to biodegrade PCB and dioxins without disturbing the soil. Anaerobic bacteria would be used to dechlorinate higher PCB congeners through reductive dechlorination. Aerobic bacteria would then degrade the dechlorinated PCB congeners to carbon dioxide and water. Nitrogen, air, nutrients, and water would be introduced to achieve the desired environment under the cap.

Alternative 6 has the same benefits as Alternative 2, but includes the option to implement treatment and achieve destruction of principal threat concentrations (>500 mg/kg) in the future. This dual-track, 1) capping and 2) treatability studies, approach to remediation meets the criteria for an interim ROD and U.S. EPA's Superfund Accelerated Cleanup Model goals of performing expedited action to eliminate immediate health threats and continuing to pursue effective options for final remedial actions.

The effect on DRMO operations under this alternative are the same as capping, with the addition of short-term access required to obtain soil for treatability studies. The access requirement would be relatively limited and of short (less than one week) duration. Capping will require approximately three months to complete. Treatability studies will require at least two to three years to complete.

The estimated cost (within -30% to +50%) to implement this alternative is $2.6 million ($161/ton), which includes $200,000 for conducting initial treatability studies.

6.4.7 Alternative 7 — Excavation of Hot Spots, Off-Site Disposal and Capping



Description — This alternative blends the benefits of capping and excavation. The principal threat is removed (approximately 3,600 cubic yards of soil with a PCB concentration exceeding 100 mg/kg, to be certain to capture all PCBs exceeding 500 mg/kg), as is the potential for dermal contact or inhalation of the remaining soil. As in Alternative 3, soil would be excavated and transported to a TSCA-permitted hazardous waste disposal facility to be stabilized and stored. Clean soil would be backfilled to restore the original grade of the site and all unpaved areas would be paved to allow DRMO operations to continue.

Evaluation — Excavation would have a potential to spread dust-borne and air-borne contaminants when the soil is disturbed. Since the excavation would focus on the principal threat, the potential affects of exposure are high. The PSP must be removed and decontaminated to implement this alternative, which also creates a potential exposure concern for workers. The alternative must meet SMAQMD air quality requirements and TSCA disposal requirements. If TCLP analytical testing indicates that the OU B1 soils are RCRA characteristic wastes, and if the total HOC concentrations (including PCBs) exceeds 1,000 mg/kg, then incineration would be required prior to land disposal to meet RCRA LDRs (i.e., this alternative would not be implementable). Also, meeting SMAQMD requirements to suppress dust emissions and not create a nuisance could involve substantial costs and barriers to compliance. Because landfilling does not reduce the toxicity, mobility, or volume of the contaminants, the objective of permanent solutions involving treatment is not met. The long-term effectiveness depends on the continued careful operation and maintenance of the disposal site by its operator. Containment failure at the disposal facility could affect groundwater and surface water quality, or result in dermal contact or inhalation of the contaminants. Currently only Kettlemen Hills is permitted to accept this waste in California.

The long-term effectiveness and permanence of this alternative is contingent upon proper management of the cap. A cap maintenance program similar to the one described for the capping alternative would be developed, documented, and approved. DRMO would be affected in the short term by this alternative, but there would be no long-lasting impact. The time required to implement this alternative is estimated to be 6 months.

The uncertainty of meeting LDRs and permitting the transportation phase of this alternative reduces its implementability, as do concerns related to equipment and PSP decontamination. The cost of excavating, transporting, and disposing of 4,400 cubic yards of soil, and capping the entire site is estimated to be approximately $3.8 million ($239/ton).

7.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This analysis compares the key advantages and disadvantages of the seven alternatives in relation to the nine criteria set forth in the NCP. The evaluations of the alternatives are based on continued industrial use of the site. The following nine sections correspond to the nine criteria, and each section contains a discussion of alternatives with respect to its criterion.

A comparative analysis of the alternatives is summarized in Table 7-1 and Figure 6-1. The numerical scores reflect the relative completeness that a criterion is fulfilled by the alternative. An effectiveness/cost quotient was also calculated for each alternative by adding the scores of the five effectiveness criteria and dividing by the alternative's cost in millions of dollars: the greater the quotient, the more cost-effective the alternative. It is important to note that each criterion is weighted equally and that these values should only be used for a general comparison between the alternatives.

7.1 Protection of Human Health and the Environment

All alternatives, except the no action alternative, are protective of human health and the environment.

7.2 Compliance with ARARs

All alternatives, except no action, have the potential to comply with ARARs. All alternatives will meet the PCB cleanup goal of 10 mg/kg established by the U.S. EPA PCB Cleanup Guidance. However, off-site alternatives (i.e., disposal and incineration) must be performed at a permitted facility meeting RCRA and TSCA standards. On-site treatment must also meet RCRA and TSCA storage and treatment standards. The difference in ARAR compliance between off-site and on-site actions is that off-site actions must meet both the substantive and permitting requirements of RCRA and TSCA, while on-site actions need only meet the substantive requirements. Capping alternatives must meet the requirements of CCR, Title 23, Division 3, Chapter 15.

All alternatives requiring excavation or treatment that would result in air emissions must meet SMAQMD air quality requirements for dust and other emissions, as well as the SMAQMD Rule 453 related to asphalt emissions. All alternatives can meet surface water quality ARARs, as long as discharges do not exceed criteria in the *California Inlands Surface Water Plan* (SWRCB, 1991).

7.3 Long-Term Effectiveness

The treatment alternatives are more effective long term because the contaminants are destroyed. Capping and disposal are not as effective long term because the contaminants are not destroyed, and management controls must be used to maintain their effectiveness. All of the alternatives, except no action, would be effective in limiting exposure to metals. Implementing the capping alternative prevents their migration, and implementing the disposal alternatives removes metals from the site and contains them in a RCRA permitted disposal site. Implementing the treatment alternatives removes the metals from the site and concentrates them into an ash. The ash will have to be stabilized and disposed in a hazardous waste landfill. It is also important to note that this is an interim solution, and

TABLE 7-1. COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

	Effectiveness Criteria										
Remedial Alternatives	Protectiveness of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Treatment	Short-Term Effectiveness	Implementability	Cost	State Acceptance[a]	Community Acceptance[a]	Total Score	Effectiveness[b]/Cost Quotient
Alt 1 No Action	0	0	0	0	0	5	5			10	0
Alt 2 Capping	5	5	3	0	5	5	3			26	9.0
Alt 3 Excavate and Off-Site Disposal	5	5	3	0	3	3	1			20	2.8
Alt 4 Excavate, Off-Site Incineration, and Disposal	5	5	5	5	3	3	-1			25	0.66
Alt 5 Excavate, On-Site Treatment, and Disposal	5	5	5	5	3	0	-1			22	1.2
Alt 6 Capping and Treatability Studies with On-Site Treatment Potential	5	5	3	0	5	5	3			26	6.9
Alt 7 Excavate Hot Spots, Off-Site Disposal and Capping	5	5	3	0	3	3	3			22	4.2

[a] These two criteria will be evaluated when the final RI/FS Report is prepared.
[b] This ratio provides an indication of the benefit provided in relation to the cost of each alternative. The effectiveness is the sum of the five effectiveness scores. The cost denominator is the estimated cost of each alternative, in $ millions.

ARARs = Applicable or relevant and appropriate requirements.

Key

<u>Criteria Except Cost</u>

5 = Meets or exceeds definition/intent of criterion
3 = Conditionally meets definition/intent of criterion
0 = Does not meet the definition/intent of criterion

<u>Cost Aspects</u>

5 = <$1.5 million
3 = $1.5 to 5 million
1 = $5 to 20 million
-1 = >$20 million

therefore, short-term effectiveness is emphasized over long-term effectiveness.

7.4 Reduction of Toxicity, Mobility, and Volume

Only the treatment alternatives reduce the toxicity, mobility, and volume of contaminants. Though the inherent mobility of COCs is not affected by a cap, capping does reduce the potential migration of COCs.

7.5 Short-Term Effectiveness

The no action alternative does not create short-term exposure threats; however, it offers no short-term benefit to human health or the environment. Alternatives 2 and 6 are very effective at protecting human health in the short-term. Alternatives 3, 4, 5, and 7, which require excavation of contaminated soils, creates short-term exposure to excavation workers (through potential inhalation, ingestion, and dermal contact); this risk is greatest for Alternatives 3, 4, and 5 because the exposure time is greater. These alternatives do pose some risk to communities near McClellan AFB during excavation and transport. Dust control measures coupled with proper health and safety procedures can mitigate the risks posed during excavation work.

7.6 Implementability

The alternatives are technically feasible and are relatively quickly implementable. Alternatives 2 and 6 are the easiest to implement and have the least impact on the DRMO operations. Alternatives 3, 4, 5, and 7 are more difficult to implement because of possible LDRs and the lack of treatment and/or disposal sites accepting dioxin-contaminated wastes. There are significant uncertainties because it may not be possible to obtain approvals to transport or treat dioxin-containing soils. Alternatives 3, 4, 5, and 7 will also cause the DRMO operations to be restricted for a longer period of time during excavation, treatment (on-site), and backfilling of OU B1 soils, and paving.

7.7 Costs

The no action, capping, and capping with potential for future treatment alternatives have the lowest overall costs. The treatment alternatives have the highest costs. The approximate present worth costs for each alternative is listed below:

- Alternative 1 — $400 thousand ($25/ton);
- Alternative 2 — $2.2 million ($127/ton);
- Alternative 3 — $5.6 million ($349/ton);
- Alternative 4 — $35 million ($2,156/ton);
- Alternative 5 — $19 million ($1,175/ton);
- Alternative 6 — $2.6 million ($161/ton); and
- Alternative 7 — $3.8 million ($239/ton).

Sensitivity Analysis

A cost sensitivity analysis was performed for the remedial alternatives to evaluate how slight changes in some of the key variables would affect the cost estimates. To determine the cost sensitivity of the design assumptions, the soil volume, present worth interest rate, and the percentage of capital costs (used to estimate long term operations and maintenance [O&M] expenses) were varied and the resulting effect on cost was calculated. The analysis results are shown on Table 7-2.

No action, capping, and capping with treatability studies are not highly sensitive to unknowns. There is no volume sensitivity, and capping is only slightly sensitive to interest rates. The alternatives involving soil excavation are very sensitive to the volume of soil. The cost/volume relationship is essentially 1:1; a 25% increase in volume increases the cost 25 percent. The alternatives involving excavation are not sensitive to long-term management factors such as interest rates and O&M.

7.8 State Agency Acceptance

Both the RWQCB and the DTSC of the Cal/EPA, as well as the U.S. EPA, have commented on the OU B1 Proposed Plan, RI/FS and ROD and have stated that they are in general concurrence with them. The agency comments on these documents, as well as the response to these comments, are presented in Attachment D.

7.9 Community Acceptance

As discussed in Part II of this ROD in Section 3.0, Highlights of Community Participation, the Proposed Plan public hearing was held on 30 June 1993. Ten comments were made at the hearing.

One additional written comment was received. All of these comments are responded to in the Responsiveness Summary (Attachment A).

Most of the comments at the meeting related to concerns with potential contaminant releases associated with placement of the cap. Potential for air emissions, surface water drainage problems, cap cracking, weather-related problems, ditch excavation problems, and cap integrity concerns were all expressed. Adequate design and construction of the cap, as well as a comprehensive cap monitoring program will diminish the potential for contaminant releases that were the concerns of the public.

Responses given to public comments reduced public concerns regarding the selected remedy. Therefore, there is public concurrence with the select remedy.

7.10 Comparative Evaluation Conclusions

Based on the comparative analysis, the Air Force selects Alternative 6 as the alternative that represents the best balance of the nine criteria.

- Alternative 1 is unacceptable because public health and the environment are not protected.
- Alternative 2 is not effective in reducing the volume and toxicity of the contaminated soils.
- Alternatives 4 and 5 are very effective, but have very low effectiveness/cost quotients due

TABLE 7-2. COST SENSITIVITY ANALYSIS

Alternative	Volume Increase 25%	Doubled Interest Rate	Doubled O&M Percentage	Sensitivity Assessment
Alt 1 — No Action	No cost impact	No cost impact	No cost impact	Not Sensitive.
Alt 2 — Capping	No cost impact	12% decrease in cost	28% increase in cost	Sensitive to factors affecting long-term management. Not volume sensitive.
Alt 3 — Excavate and off-site disposal	14% cost increase	No cost impact	No cost impact	Sensitive to volume. Not sensitive the issues affecting long-term management.
Alt 4 — Excavate, off-site incineration, and disposal.	24% cost increase	No cost impact	No cost impact	Very sensitive to volume. Not sensitive the issues affecting long-term management.
Alt 5 — Excavate, on-site treatment, disposal	17% cost increase	No cost impact	No cost impact	Sensitive to volume. Not sensitive the issues affecting long-term management.
Alt 6 — Capping and treatability studies	No cost impact unless treatment implemented	10% decrease in cost	22% increase in cost	Sensitive to factors affecting long-term management. Not volume sensitive.
Alt 7 — Excavation of principal threat and capping	9% cost increase	7% decrease in cost	15% increase in cost	Limited volume sensitivity, sensitive to factors affecting long-term management.

to extremely high costs ($35 and $19 million, respectively).

- Alternatives 3, 4, 5 and 7 are less effective because of short-term risks associated with excavation, transportation, and/or disposal. There may also be difficulty in implementing these alternatives because of potential LDRs and obtaining permits to excavate, transport, and treat dioxin-containing soils.

Alternatives 3 and 7 are potentially not implementable due to LDRs if the soils are considered RCRA characteristic wastes and if HOCs exceed 1,000 mg/kg.

Alternative 6 is easily implemented, reduces health and ecological risks, is cost effective, and provides the potential for treatment of contaminated soils in the future.

8.0 THE SELECTED REMEDY

8.1 Description of the Remedy

The selected remedy (Alternative 6), which addresses the primary risks posed by soil contamination (characterized as a principal threat at this site), consists of the following components:

(1) The site will be capped using a minimum two-inch thick asphaltic concrete cover over engineered fill, eliminating any immediate threat by minimizing infiltration of surface water and preventing ingestion, dermal exposure, and inhalation of contaminated dust.

(2) Sediments in the drainage ditches leading off the site determined to contain contaminants that pose health or ecological risks (above cleanup standards) will be excavated and placed under the cap. A sediment trap will be installed in the drainage ditch leaving the DRMO yard to collect any sediment transported by storm runoff that may carry adsorbed contaminants.

(3) To comply with ARARs, the cap will reduce contaminant releases to air and groundwater to below measurable levels.

(4) The cap will be maintained and periodically repaired for long-term effectiveness, in compliance with a cap monitoring and maintenance program. This program will be developed and approved by the agencies as an enforceable document. It will be included in the Operations and Maintenance Plan.

(5) Surface water, vadose zone soil gas, and groundwater will be monitored to assure long-term effectiveness. The monitoring plan will be documented and enforced through the Operations and Maintenance Plan and will include sampling and analysis of soil pore liquid, soil gas, and groundwater.

(6) Soil treatment technologies will continue to be evaluated following specific performance criteria that will be documented in the RD/RA Work Plan, providing time to evaluate and develop cost-effective technologies applicable as final remedial solutions for OU B1. An annual progress report will also be prepared.

(7) Prior to selection of a final remedy, institutional controls, in the form of deed restrictions, will be invoked to ensure that the area of OU B1 will be used only for industrial activities.

The selected alternative is consistent with the criteria of interim remedial actions and with the basewide remediation strategy developed for McClellan AFB. The alternative will protect employees and site visitors from health risks and prevent further migration of contamination while a final remedial solution is developed. Therefore, the alternative meets the criteria for interim actions. The McClellan AFB remediation strategy calls for short-term actions that will successfully reduce the significant threats to health and the environment and the continuing development of cost-effective technologies to reduce contaminant toxicity, mobility, and volume as final remedial solutions. The total capital costs of this remedy are estimated (within -30% to +50%) at $2.6 million.

The remedy selected will result in hazardous substances, the COCs, remaining in OU B1 for an indefinite period of time. Therefore, a review will be conducted five years after construction of the cap and every five years thereafter that the hazardous substances remain. The review will ensure that the remedy selected continues to provide adequate protection to human health and the environment.

Figure 8-1 presents a decision logic diagram for remediation of all media in OU B1. This figure illustrates the decision process for contaminants that are present or may be detected in all media.

8.2 Statutory Determinations

8.2.1 Protectiveness

The selected remedy is protective of human health and the environment. Protection will be achieved at this site in the following ways:

- Capping the contaminated soils and sediments reduces the chance of either human or environmental receptors contact with the contaminants; and

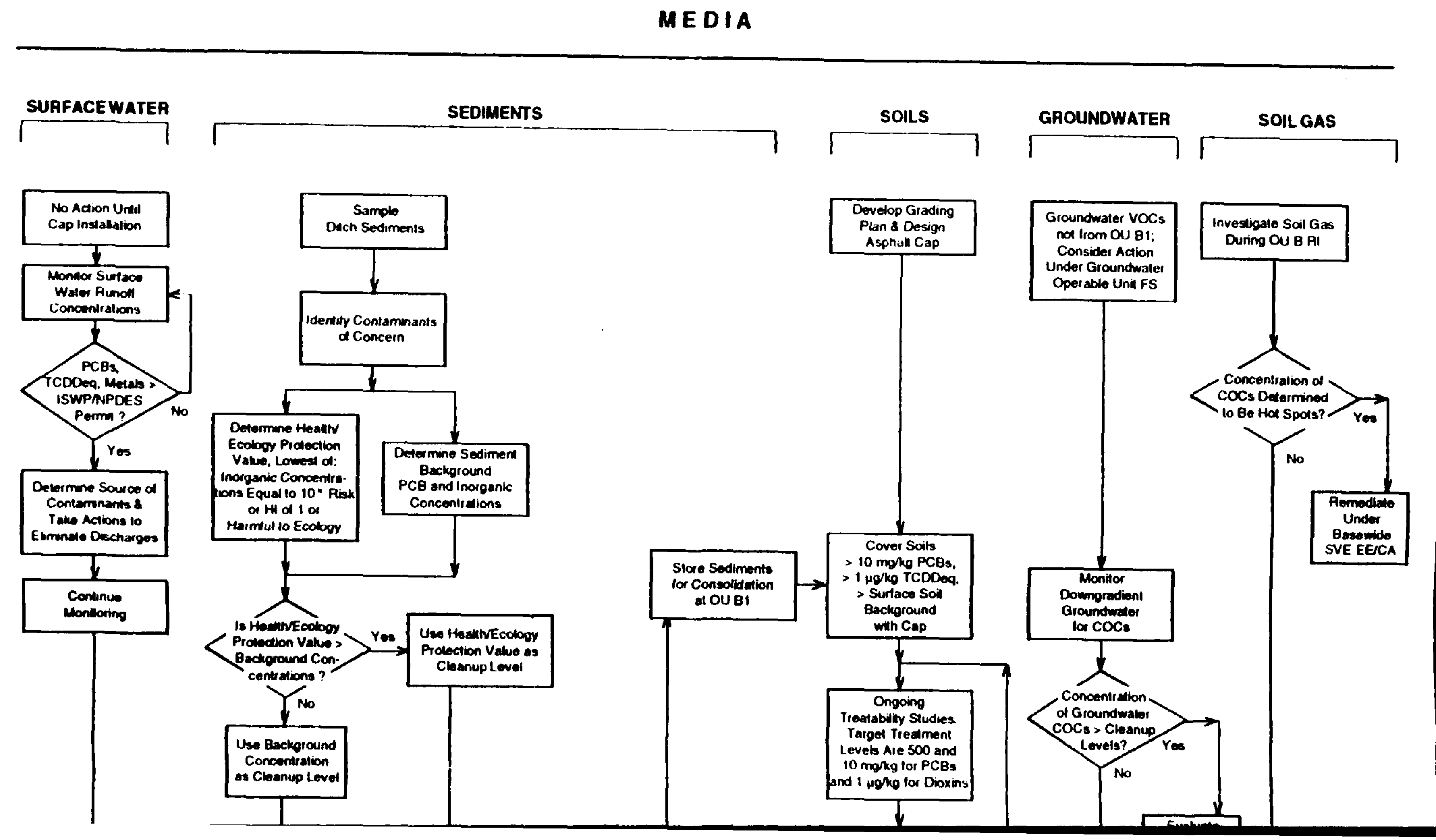
- Capping reduces the potential for contaminants to be carried in runoff to downstream receptors.

8.2.2 Applicable or Relevant and Appropriate Requirements

Chemical-Specific ARARs — ARARs for soil and sediment cleanup standards have not been established. However, cleanup standards of 10 mg/kg for soil from 0 to 3 feet BGS and 100 mg/kg for soil greater than 3 feet BGS for industrial sites are consistent with *Guidance on Remedial Actions For Superfund Sites With PCB Contamination*, OSWER Directive No. 9355.4-01, August 1990, which is a TBC criterion. Because this cleanup level is for industrial sites, institutional controls will be emplaced to ensure that the use of the site remains industrial. The selected remedy meets the PCB cleanup standards.

No chemical-specific ARAR for dioxin and furan compounds was identified. However, a cleanup standard of 1 μg/kg TCDD equivalent has been accepted in a number of previously approved records of decision. Because of the previous acceptance of 1 μg/kg TCDD equivalent as a cleanup standard protective of human health and the environment, it was considered and accepted as a cleanup standard for OU B1 soils. The selected alternative will meet the dioxin cleanup standard.

The Inland Surface Waters Plan (SWRCB, 1991) is an ARAR that lists contaminant concentration criteria protective of human health and the environment. The criteria identified for COCs in OU B1 have been adopted as cleanup standards. The selected remedy is expected to meet this cleanup standard; a monitoring program will be implemented to assure this.


MEDIA
SURFACE WATER
SEDIMENTS
SOILS
GROUNDWATER
SOIL GAS
No Action Until Cap Installation
Monitor Surface Water Runoff Concentrations
PCBs, TCDDeq, Metals > ISWP/NPDES Permit ?
No
Yes
Determine Source of Contaminants & Take Actions to Eliminate Discharges
Continue Monitoring
Sample Ditch Sediments
Identify Contaminants of Concern
Determine Health/ Ecology Protection Value, Lowest of: Inorganic Concentrations Equal to 10⁻⁶ Risk or HI of 1 or Harmful to Ecology
Determine Sediment Background PCB and Inorganic Concentrations
Is Health/Ecology Protection Value > Background Concentrations ?
Yes
No
Use Health/Ecology Protection Value as Cleanup Level
Use Background Concentration as Cleanup Level
Store Sediments for Consolidation at OU B1
Develop Grading Plan & Design Asphalt Cap
Cover Soils > 10 mg/kg PCBs, > 1 µg/kg TCDDeq, > Surface Soil Background with Cap
Ongoing Treatability Studies. Target Treatment Levels Are 500 and 10 mg/kg for PCBs and 1 µg/kg for Dioxins
Groundwater VOCs not from OU B1; Consider Action Under Groundwater Operable Unit FS
Monitor Downgradient Groundwater for COCs
Concentration of Groundwater COCs > Cleanup Levels?
Yes
No
Investigate Soil Gas During OU B RI
Concentration of COCs Determined to Be Hot Spots?
Yes
No
Remediate Under Basewide SVE EE/CA

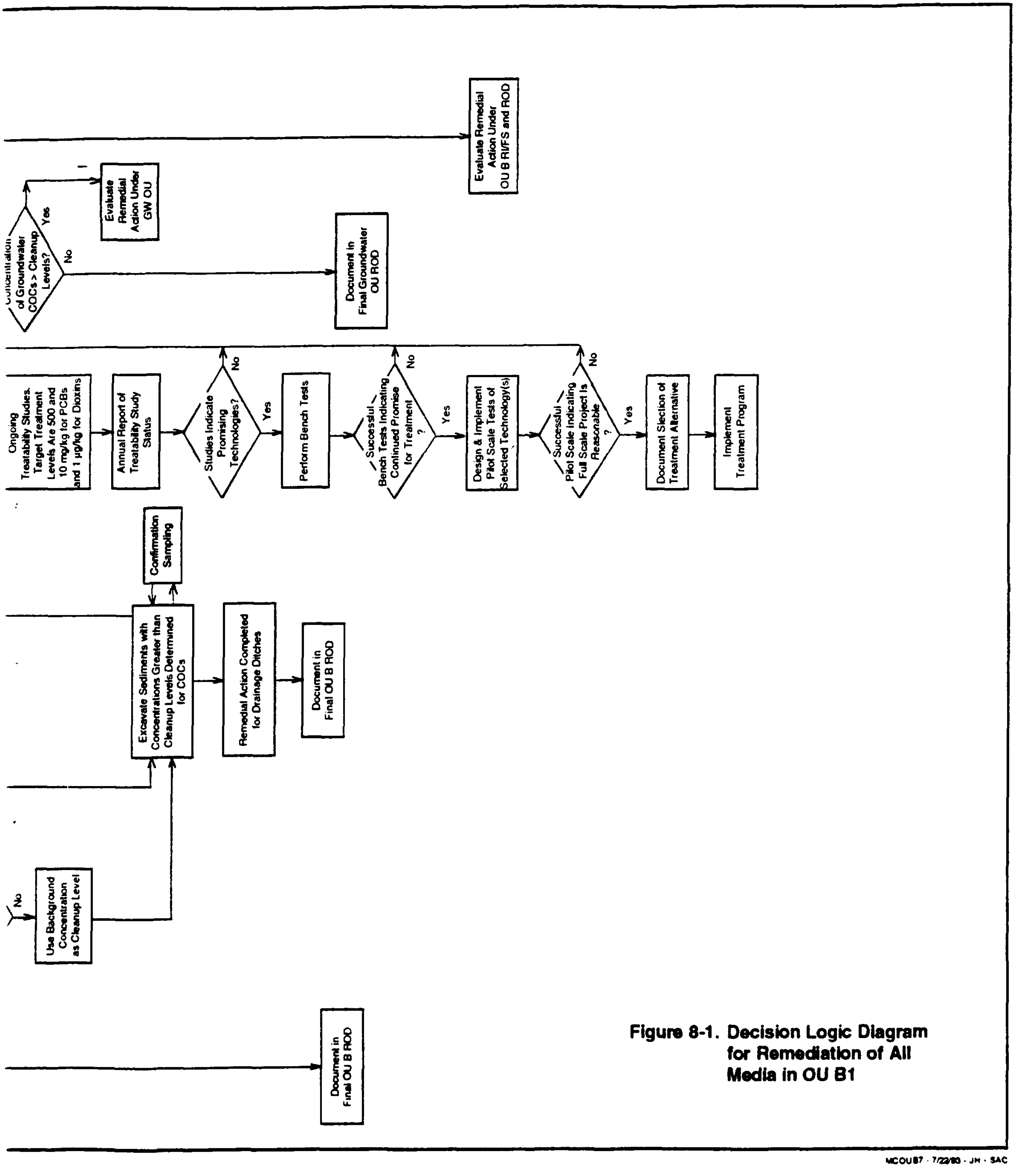


Figure 8-1. Decision Logic Diagram for Remediation of All Media in OU B1

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Action-Specific ARARs — The capping action must be implemented to meet the requirements of Title 23, Chapter 15, CCR. These include the following:

Article 1, Section 2511(d) - General Requirements;

Article 2, Section 2524 - Inert Waste Classification;

Article 4, Sections 2541 and 2546 - Construction;

Article 5, Sections 2551, 2556, 2557, 2558 - Monitoring and Response Programs; and

Article 8, Sections 2580, 2581 - Closure Requirements.

Potential future treatments of soil may be subject to certain requirements, such as permitting, depending on the recommended treatment system identified from the treatability studies.

Location-Specific ARARs — There have been no location-specific requirements identified as ARARs for the cleanup of the OU B1 site.

8.2.3 Cost Effectiveness

The remedy is cost effective because maximum protection is achieved for the estimated cost of performance. The comparative analysis of the alternatives (see Section 7.1) demonstrates that additional remedial action and the cost associated with that action would not achieve a measurable reduction in risk, but that less effort and a lower cost would result in a measurably higher risk at the site.

8.2.4 Use of Permanent Solutions, Alternative Treatment, or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy combines containment and treatability studies, providing the best mix of short-term protection of human health and the environment, and application of alternative treatment technologies to a long-term solution. It also allows for the continued industrial use of the site. While some of the alternatives not selected provide more immediate permanent solutions (e.g., off-site incineration), both the risk, costs, and uncertainties of these alternatives exceed that of capping. The potential for a long-term solution is also left open by the evaluation of treatment technologies through treatability studies.

8.2.5 Preference for Treatment as a Principal Element

The selected alternative includes an evaluation of treatment technologies as an integral part of the cleanup plan for soils and sediment. The commitment of the signer's of this agreement to this evaluation demonstrates their intent to satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element.

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ATTACHMENT A

RESPONSIVENESS SUMMARY for
PUBLIC COMMENTS RECEIVED from
JUNE 16, 1993 through JULY 16, 1993

(COMMENTS WERE RECEIVED ON THE PROPOSED PLAN FOR
THE FINAL REMEDIAL ACTION AT McCLELLAN AFB OU B1
IN SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA)

Attachment A

RESPONSIVENESS SUMMARY

for PUBLIC COMMENTS RECEIVED from

JUNE 16, 1993 through JULY 16, 1993

ON THE PROPOSED PLAN FOR THE INTERIM REMEDIAL ACTION AT McCLELLAN AFB OPERABLE UNIT (OU) B1 IN SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA

This document summarizes and responds to all significant oral and written comments received on the U.S. Air Force's Proposed Plan for the McClellan AFB OU B1 site in Sacramento, Sacramento County, California, during the 30 day public comment period. A copy of all the comments received, as well as the transcript for the 30 June 1993 public meeting, is included in the Administrative Record file. Part I presents verbal comments received at the public meeting and Part II presents all written comments received during the public review period.

RESPONSIVENESS SUMMARY - PART I

COMMENTS RECEIVED FROM LOCAL COMMUNITY MEMBERS AT THE 30 JUNE 1993 PUBLIC MEETING

1.) One commenter was concerned that the cap was to be placed down over rock and shale that could become contaminated or allow contaminants to migrate away from the site.

Response:

The rock and shale is actually a layer of clean aggregate sub-base, or gravel material, that will be placed on top of the contaminated soils prior to installation of the asphalt cap. The purpose of the aggregate, as with construction of any paved area, is to support the asphalt cap so that its integrity is maintained. The asphalt cap will prevent the migration of contaminants, by directing all rainwater off the site. Surface water will not come in contact with any of the contaminated soils.

2.) One commenter asked whether the Defense Reutilization and Marketing Office (DRMO) yard would be used during the remedial action. He also expressed concern that the 2-inch cap may not be sufficient to support moving heavy equipment over it.

Response:

The DRMO yard will remain in operation during the capping action. The cap will be placed down in a sequential manner, which will allow equipment and DRMO operations to be temporarily moved around the yard, to accommodate the cap installation. The thickness of the cap will be designed to withstand all loads that the DRMO operations will place on it (e.g., forklifts and heavy equipment).

3.) One commenter wanted to know why contaminated soils outside of the DRMO yard were to be consolidated under the cap at the DRMO yard. He also wanted to know specifically what soils were to be consolidated at the DRMO yard.

Response:

Consolidation of contaminated soils in a single area under a cap is more protective of public health and the environment and is cost effective. This action lessens the area of contamination, the amount of capping cover required, and makes control easier. Also, consolidation makes it easier for potential future treatment actions since the contaminated soil is already in one place and would be easier to handle. Soils to be consolidated are from the drainage ditches leaving off at the DRMO yard, and other areas north and east of the yard. Also, some soils within the DRMO yard itself will be consolidated. An area of contamination in the southern part of the yard will be moved north where the more contaminated areas are located. This southern area will be paved, although in the future the pavement in this area may be disturbed as a new building may be constructed there.

4.) Two commenters expressed concern about the emission possibility of airborne contaminants during the excavation of the ditches. A concern was also expressed that using too much water during dust suppression activities could wash contamination into downstream surface waters.

Response:

An air emissions monitoring program will be carried out during the excavation of the ditches. Instruments will monitor emissions of suspected contaminants. If concentration levels in the air exceed public health standards, then work will stop and measures will be taken to ensure levels are not exceeded again. Water will be used for dust suppression but not in quantities that would cause surface water runoff to occur. Details on all of these duct suppression and air monitoring activities will be provided in the remedial design documents and will be reviewed and approved by the Air Force and public agencies prior to implementation.

5.) Two commenters expressed concern over the possibility that early rains could occur prior to or during placement of the cap in the fall. These rains could cause airborne contaminant releases or contaminant runoff to occur, if the rain comes during construction or when the temporary liner is removed.

Response:

The contractor responsible for installing the cap must have contingency plans to respond to all possible interruptions of work, including rain, that will prevent release of contaminants. The plan must be approved by McClellan AFB staff, and will be a part of the contract. The "hot spot" area under the temporary lines will be capped first. The temporary liner will also be kept to use elsewhere on site as a temporary cover should early rains occur.

6.) Two commenters expressed concern that the excavation of the ditches and the other soils consolidation actions would upset the natural flow of surface water runoff, subsequently causing erosion.

Response:

The design of the remedial action, including excavation of ditches, will take into account adequate drainage and not cause any undue erosion. The contractor's plans will include drainage details from the cap. The depth of excavation in the ditches will not be great, probably in the range of less than a foot. The excavated material will predominantly consist of sediments that have collected in it. If more extension excavations are required in any areas, an analysis will be performed to determine whether additional earthwork is required to maintain drainage patterns. Magpie Creek, in particular, will be protected from any change in normal stormwater flow as a result of the remedial action.

7.) One commenter stated that the movement of heavy equipment in and out of the DRMO yard could tend to push the blacktop up, causing cracks. Is there a plan to monitor for such cracks, where would such information be kept, and who would be responsible?

Response:

A plan to monitor the integrity of the cap will be prepared, approved by the regulatory agencies and implemented as part of the remedial action. This plan will include monitoring surface water runoff, as well as checking the condition of the cap. If cracks are found, they will be fixed to bring the cap back to its original standards. This plan will be the responsibility of McClellan AFB, and will be followed as long as the cap is in place.

8.) One commenter asked if the ditches were going to be backfilled after they are excavated.

Response:

Backfilling of excavated ditches is not planned at this time, since the depths of soils to be excavated is not expected to be very deep (i.e., approximately only the top foot of soil). Most of the soil that will be removed is sediment deposited in the ditches during storms. In effect, the ditches will be dredged out to their original condition. If additional excavation is required that would cause surface water runoff to no longer be handled effectively by the ditches, then backfilling or some other earthwork would be required to maintain adequate drainage patterns in the area. The design for the remedial action will address and resolve this issue.

9.) One commenter asked whether Magpie Creek would continue to be monitored, even after the capping action occurs.

Response:

The monitoring of water quality in Magpie Creek will continue at several locations, since this surface water body accepts runoff from numerous areas on base. Monitoring upstream and downstream from where the ditches enter the creek will help verify that no contaminants are being released from the capped area.

10.) One commenter noted that part of the DRMO is already capped. He asked if these areas would be brought up to the grade of the newly capped areas.

Response:

All areas of the DRMO yard where contamination exceeds cleanup standards are to be paved. Those presently paved areas that may be cracked or substandard will be brought up to the same design standard being applied to newly capped areas.

RESPONSIVENESS SUMMARY - PART II

WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

1.) One commenter expressed general concern about the pace of cleanup actions at McClellan AFB. He felt that cleanup actions take too long, require too much paperwork, and emphasize the movement of contaminated soils about the base instead of actually cleaning up the soils.

Response:

McClellan AFB has a very large and well-funded program under way to clean up all contamination on base. Part of the mission of the base is to cleanup all contaminated soils and groundwater as fast as possible, while meeting all regulatory requirements. In this particular project, McClellan AFB selected treatment of the contaminated PCB soils as the best option; however, because no proven technologies exist today to treat these soils without any risk of further contamination, McClellan AFB has decided to cap the site now to prevent contact, and to then commit resources to conduct studies on the treatment of these soils. This should hopefully lead to the selection of an appropriate technology and eventual treatment of the soils under the cap.

ATTACHMENT B

TRANSCRIPT OF PUBLIC MEETING ON OU B1 INTERIM PROPOSED PLAN

Note to the Reader:

On pages 13, 15, 18, 20, 24 and 32, handwritten edits of the transcript have been made. These edits reflect typographical errors that were made when the transcript was typed.

PUBLIC MEETING

ON

OPERABLE UNIT B1

MC CLELLAN AFB INTERIM PROPOSED PLAN

ORIGINAL

BELL AVENUE SCHOOL

MULTIPURPOSE ROOM

1900 BELL AVENUE

SACRAMENTO, CALIFORNIA

WEDNESDAY, JUNE 30, 1993

7:10 P.M.

Nadine J. Parks

Shorthand Reporter

A P P E A R A N C E S

--oOo--

Mr. Fran Slavich
Remedial Program Manager
McClellan Air Force Base

Debbie Heindel
Community Relations
McClellan Air Force Base

Elaine Anderson
EMR
McClellan Air Force Base

Theodore A. Dean
Project Engineer
EMR
McClellan Air Force base

Also Present:

Sue Sher, Cal-EPA
Mark Malinowski, Cal-EPA
Herb Levine, U.S.EPA
Alex MacDonald, Regional Water Quality Control Board
State of California
Capt. Shelley Zuehlke, McClellan AFB
Burl Taylor, Public Rep., County of Sacramento
Charles Yarbrough, Public Rep., City of Sacramento
Victor Avvinen, Radian
Randy Marx, Radian
Stephanie Benedict, Radian

I N D E X

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P R O C E E D I N G S

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MR. SLAVICH: Okay. My name is Fran Slavich. I work for the Environmental Restoration Division at McClellan. And I'd like to welcome you to tonight's public meeting on Operable Unit B1 remedy selection.

And we do have an agenda shown up at the front of the screen. We'll go through some introductions and administrative for the meeting itself, and then a little background for the people who aren't familiar with the program, how we got to this point.

We'll go over the remedial investigation results, basically the sampling results that we've come up with, and then also how we went through remedy selection and how we picked the alternative for this operable unit; present the preferred alternative -- and, again, it's just the preferred alternative. The purpose of this meeting is to get the public input and comments on the preferred alternative.

And then, at the very -- the last part of the meeting -- and all of the first six things should take maybe 45 minutes. So, we should have at least a good hour, or as long as it takes, to get anybody's questions or comments.

So, with that, I would like to say that we're really excited about this. This is the first record of decision that McClellan has moved towards. It's a real important meeting for us, and we definitely want to get your input.

And with that, I'll turn it over to Debbie Heindel, who will go over some administrative procedures.

MS. HEINDEL: We were expecting a little more formal meeting, but I know so many of you, that it's a little less formal.

First of all, what I'd like to point out to everyone is that it's important to note that no final decision has been made on what we're about to do. This is a proposed plan. And until we have the public's comments and feedback, the record of decision will not go forward. So, it's very important. The public comment period lasts until July 16th. Comments can be mailed to us, or they can be given orally tonight.

If you know somebody that couldn't make it here tonight but would like to present a comment, take some of the proposed plans that are in the back of the room. There is a comment sheet inside there with our return address on it where you can make your comments.

And all the comments, whether they're mailed to us in writing or whether they're made orally here tonight, will be made part of the responsiveness summary and made part of the administrative record.

So, there's plenty of time for people to make comments even though they couldn't make it to the meeting here tonight.

But it is important for you to understand that no final decision has been made.

At this point, I'd like to introduce some of the people that are in the audience that you may know or you may not know, but they may be able to provide you with more information you may feel you need.

And first, we have from the U.S. EPA Region IX, Mr. Herb Levine, from San Francisco.

Yes, if you wouldn't mind just standing when we say who you are, so that the public, who may not know you, will be able to spot you.

Next, we have from the California Department of Toxic Substances Control, the Remedial Project Manager for McClellan, Mark Malinowski, and the public participation specialist, Sue Sher. Sue greeted you in the back.

We also have from the Regional Water Quality Board, Mr. Alex MacDonald.

The next three men that I'm about to introduce are very, very important to both the base and to the community as well. And they are the public representatives. And if I could have you stand up when I call your name. First, we have from Sacramento County, Mr. Burl Taylor. And we have from the City of Sacramento, Chuck Yarbrough. And then we have from the local union at McClellan, Local 1857, Mr. Del Calloway.

And they've been doing a lot of work on the public's behalf and a wonderful liaison for the base. And so, if you don't know them, you really ought to get to know them, because they're really, truly your representatives, and they're doing a very, very good job at that.

Okay. Our presentation will consist of some background on the site and some of the alternatives that we have looked at. We will also talk about why we prefer one remedy over the others. And that should be, like Fran said, brief, about 45 minutes. And then we'll move to the most important part of the evening, and that's to take the public's comments. And we really are soliciting those comments. We want to know that you're satisfied that this is the best remedial action that we can take at this time. Okay.

Now, the way we're going to go about doing that is, during the presentation, we worked really hard to finally get it real concise and work out a good background for you. So, we ask, if you can, hold your questions until the end. And at the end, you can ask your questions. And you'll be given plenty of time. If you think of a question that you want to ask, you know, in the middle, just write it down on your comment sheet, and you can either have it ready later, or read it later, or even just turn it in, and it will become part of the record.

Okay, so if you can hold your comments until the very end, it would be appreciated.

Because everything tonight is being taken down word by word by a court reporter, we ask that, when you speak, you give your name and your address and, if possible, spell it. And our reporter will let you know -- she promises she'll let you know that she didn't hear what you said or she needs you to spell your name, or something like that.

So, if you can step to the microphone, if you're willing. If not, you can ask your question, and we'll repeat it up in front just so that we're sure that it gets into the record the most accurate way.

Okay. Basically, I've covered my main topics. Again, I want to emphasize that no final decision has been made. If you do want to mail your comments to me -- well, I do have a slide to show the address, but the address is in the insert for the proposed plan. So, at this point, I'll hand it back to Fran.

MR. SLAVICH: Okay. Thanks, Debbie.

My job now is to kind of set a little background, particularly for the people in the public that might not know how we got to where we're currently at. And, first of all -- and all of these are also in your packet of handout materials, so you can follow along if you can't see those well enough.

This is a map of the base. And here in the lower left corner in the inset is what's called Operable Unit B, and within that, Operable Unit B1. And that's what we're focusing on tonight.

And what is an operable unit? Well, McClellan has over 250 areas on base that we have to investigate for potential waste disposal practices and contamination. And 250, that's a lot of sites to be concerned about. So, we have to group them into something that's manageable, and that's what an operable unit is. It's just a way for us to group sites together. And Operable Unit B, as a whole, has about 47 of those 250 sites.

So, Operable Unit B1 is just a subset of Operable Unit B, and it consists of the DRMO facility at McClellan, which is just right across the street actually. We're here at Bell Avenue. If you go across the street into McClellan, the DRMO facility is right there. So, it's really not far from where we're at.

Where is Operable Unit B1 fit into the overall McClellan picture? This is our overall schedule to clean up the base. And actually, it's just a schedule to get to a final decision for the entire cleanup of the base. And if you look at your handout, you can see that that decision is in about the year 2002 timeframe. So, we're still a good nine years away from getting a complete comprehensive decision for McClellan.

Well, each of the operable units that I talk has their own schedule, and Operable Unit B1, shown here, is the earliest clean-up decision that we've come to. And that's really what we're doing tonight. We're trying to present how we went through the process of selecting a remedial alternative for Operable Unit B1.

And, as Debbie said many times, it is just a preferred alternative. Nothing is written in stone by any means. That's what the public meeting is for. It's to get the public's comments.

And these are what's called CERCLA, the nine criteria. It's what we use when we evaluate what is a good remedial alternative for an operable unit. And there's nine of them. And the one's that McClellan has looked at are the first seven -- protection of human health and the environment; that has to happen. We have to comply with what's called ARARS, and those are really regulations.

It has to be protected in the long term, and somewhat permanent. We want to make sure we reduce the toxicity of the contaminants and their mobility; treat it, if possible. It had to easy to implement and have some short-term effectiveness. We don't want to take a long time to do it. And then, we do have to consider cost, because cost is a major feature.

But the last two criteria -- State acceptance and community acceptance -- we can't satisfy those criteria until we have this meeting and we get all of the comments, and we respond to each and every comment.

So, I just want you to keep this in mind that, later on, as Tad Dean and Elaine are going through the alternatives that we've looked at, this is what we've used to try to come to a decision, these nine criteria.

So, with that -- well, I guess there's one more thing I need to go through. And that is what's called a CERCLA process. And you have this in your handout also.

CERCLA is the law which we operate under to clean up hazardous waste sites. And you start off on the left in what's called a preliminary assessment, and that's where you're just gathering historical information about the site, trying to find out if -- let's say, you talk to somebody who's worked at a shop, and they tell you that, in past years, people dumped things on the ground. You try to get information through interviews to find out if the site is a potential place to look at.

Well, then, we go into what's called a remedial investigation. And that's where we actually go out -- we think something probably has some contamination, and now we have to take samples and confirm that.

Well, once you get a certain amount of samples, it'll become obvious whether or not that site is going to pose a high risk. And that is what happened for Operable Unit B1. At the DRMO facility we found PCBs. It was a high risk, so that's why we broke it out into Operable Unit B1, to do it a little faster.

So, then you go into what's called the feasibility study. After you get the sampling data, now you want to figure out how you're going to clean this up or how you're going to solve the problem.

So, we're down here (indicating on slide). After we've done this risk screening and decided that we have a problem, we've expedited the remedial investigation and the feasibility study. We produced a proposed plan, which is just what it says, McClellan proposes what they think is the best alternative. And then we come to this point, the community meeting -- and that's where we are right now -- to get comments on this proposed plan. Do you think that we've been smart in selecting an alternative?

And then, after that, is an interim record of decision, which documents what we're going to do, and then we go out and take the action.

Okay. So, with that, I'll introduce Tad Dean, who'll go over the remedial investigation and the alternatives.

MR. DEAN: Thank you, Fran. As Fran just said, my name is Tad Dean. I'm the project officer who oversaw the remedial investigation and feasibility study at Operable Unit B1.

Tonight, I'll discuss the nature and extent of contamination discovered at Operable Unit B1, which was revealed during the remedial investigation. I will also discuss clean-up goals, and present several remedial alternatives considered in the Operable Unit B1 feasibility study.

These alternatives will address the contamination at the site that we discovered at Operable Unit B1.

I'd like to open the discussion of the remedial investigation by asking four fundamental questions. What did the investigation consist of? What was found at the site? What do the results mean? And finally, what did the Air Force do to reduce short-term exposure potentials at the site?

The investigation at Operable Unit B1 was quite extensive. On this overhead, I have shown all the sampling locations on Operable Unit B1. Surface scrapes are indicated by the small squares on the map, which consists of soil samples collected between zero and six inches on the site.

Hand augers at the site are indicated by the larger squares, such as this one here, and consists of the soil samples collected between zero and five feet below the ground surface. The hand augers and the surface scrape at the site helped determine the horizontal and vertical extent of contamination at OU B1.

There were several soil borings placed on the site at various locations and indicated by the round dots. Part of the reason to have soil borings at the site was to help determine the vertical extent of contamination where we did find PCB contaminants at the bottom of the hand augers.

We also collected sediment samples at several locations in the adjacent drainage system OU B1 and downstream of the operable unit. These sediment sample locations are indicated on this poster board by the black squares.

All the samples were collected and analyzed primarily for PCBs. And at certain locations, we collected samples and analyzed them for other constituents, such as dioxins and heavy metals.

Well, now that these -- all these samples were collected, what was found at the site? The investigation revealed, for the most part, widespread low-level contamination consisting primarily of PCBs over the entire site, with a few areas of higher concentration. The higher concentration areas are indicated in red. The lower concentration areas are indicated in yellow.

Dioxin concentration appears to be proportional with the PCB concentration. The highest levels of dioxin are in the red areas at the site, which I'll refer to as the "hot spot," if you will.

Subsurface soil sampling at the site has indicated that the contaminants have only migrated to approximately seven feet below the ground surface. What I have displayed here is a contaminant profile of approximately six feet below the ground surface.

As you can see, the contaminants migrated deepest in the area's highest concentration, which makes a lot of sense for our site. And then, at seven feet, we basically see the concentrations drop off to none reported, which means we don't have anything there.

What this means is that the contaminants have not reached groundwater, and they are far from reaching groundwater at this point.

Sediment sampling in the drainages adjacent to the operable unit and downstream of the operable unit indicated that surface soils have migrated from the site. The concentration decreases as distance increases form the site. We collected several samples in the Magpie Creek drainage at three locations and basically found nothing at that point.

Now that we've defined the contamination on Operable Unit B1, what does the results from this investigation mean?

Once the data is qualified, a health risk assessment is conducted to help set cleanup goals for this site. What is a health risk assessment?

This is an evaluation of potential adverse health effects due to long-term exposure to contaminants at a particular site.

How does a health risk assessment apply to Operable Unit B1?

I'd like to start out by saying that the nationwide average indicates that out of one million people, approximately 250,000 will develop cancer in form or another in their lifetime. That's a nationwide average based on available statistical information.

The worst-case scenario for Operable Unit B1 is that there is an increased potential for an additional 20 cancer cases at this site due to site contamination. This worst-case scenario is based on a DRMO yard worker. DRMO stands for the Defense Reutilization and Marketing Office, where the contamination is, in their storage yard.

And this worker is assumed to work at the site eight hours per day, five days a week, for 30 years.

Once the PCB contamination was found at Operable Unit B1, what was done to prevent worker exposure?

The Air Force immediately cordoned off the areas of higher contamination in the yard, which is indicated by this box, these two squares here. This represents a chain link in the area that was installed to minimize exposure to the contaminants. The employees that work at this facility were briefed on what was found in the yard, and a program was implemented to restrict access into the yard. And the yard workers were required to wear rubber boots while working in the yard.

A solid steel covering was installed over the PCB contamination in the main area that exceeded 100 parts per million. Concurrent to this action, industrial hygiene sampling was conducted in the work areas of the DRMO, and the results of the monitoring revealed PCB contaminant levels were below OSHA standards.

Once this was determined, the industrial controls were reduced. The Air Force took an aggressive and overprotective stance to protect the employees at the yard. We feel it is easier to be overprotective at first, and then reduce controls at a later date.

The final step was to conduct a removal action, which is intended to further protect the environment and human health.

This is where we installed an impermeable liner over the main areas of the contamination on the site, which is indicated by this gray area on the map.

This impermeable liner reduced the migration of the surface soils into the adjacent drainage system at the DRMO.

At this point, I'd like to discuss three fundamental questions considered during the feasibility study at Operable Unit B1. What are the cleanup objectives at Operable Unit B1 and how can these cleanup objectives be met? And, finally, what are the cleanup options for Operable Unit B1?

The cleanup options we have identified are numerous ~~And~~ and I have listed the five most important on this slide. Protection of human health and the environment is of primary importance to us to achieve a successful action at Operable Unit B1.

We definitely want to leave the site in a condition that it can be used in the future for one purpose or another. The Air Force has come to the realization that we have contamination at the site, and we want to expedite cleanup and accomplish this in a timely manner. Finally, keeping the DRMO in operation during and after the cleanup is essentially a subset of allowing for future land uses.

The levels listed in this slide have been based on a health risk assessment and also based on other remedial decisions made at other Superfund sites across the country with similar contaminant profiles.

We're proposing to remediate PCB contaminated soils and sediments greater than 10 parts per million for soils between the surface and three feet. For soils greater than three feet in depth, 100 parts per million will be our cleanup level.

For dioxins in soils and sediments, greater than one part per billion for all depths is our established cleanup goal.

By cleaning the soils to these levels, at the Operable Unit B1, we will lower the potential additional cancer risk to less than one in one million. To be effective in protecting the environment, we must also comply with the established McClellan Air Force Base storm water discharge permit. And finally, to accomplish all of this in a timely manner, we must employ an effective and commercially available cleanup technology.

We have identified several alternatives and evaluated these seven alternatives against the first seven criteria of CERCLA. The last two criteria, as Fran had indicated, are what this meeting is all about, and they will be evaluated as a result of this meeting.

I'll present the first six of these alternatives and give reasons why they didn't meet all of the CERCLA criteria. Elaine Anderson will then present the preferred alternative and good reasons for this preference.

This slide presents a cost comparison between the first six criteria I am going to present. The no action alternative is used as a baseline to evaluate other alternatives and compare them. No action in this case is not desirable and is obviously not effective in treating or containing the contaminants at OU B1.

The histogram on this slide and the slides to come indicate the first set of criteria of CERCLA and give the strengths for meeting that criteria by an elongated bar or weakness for not meeting that criteria by a short bar.

Disposal of hazardous waste at a landfill would involve the excavation of the contaminated soils and hauling them to a licensed disposal facility. McClellan Air Force Base is committed to solving environmental problems at McClellan. And we do not wish to pass the problem on to future generations to solve.

Furthermore, should the landfill facility be irresponsibly managed by the owner, the Air Force would be at a potential risk to pay for cleanup of the site. This would simply cost the taxpayers more money in the long run for additional cleanup.

It is therefore the opinion of the Air Force, we would prefer not to pursue this alternative.

Capping or onsite ~~ansate~~ containment would involve paving the storage yard with asphalt. This alternative is effective in containing the contaminants and would prevent further spreading of the contaminants to the adjacent drainage system.

However, the Air Force would prefer to treat the soils some time down the road. One of the criteria gives a preference for reduction of toxicity, mobility, and volume through treatment. This alternative, as presented, does not allow the flexibility to treat as part of the long-term solution.

Excavation of the contaminants that exceed 500 ppm of PCBs and hauling these contaminants to a licensed disposal facility and capping the remainder site is the trust of this alternative.

For the reasons discussed on the landfilling alternative, McClellan would prefer not to pursue this alternative.

Excavation and off-base incineration would involve excavating the soils at Operable Unit B1 and hauling them to a licensed incineration facility. This is the most widely used technology for the destruction of contaminants similar in nature found in Operable Unit B1.

However, incineration is also the most expensive.

And we are estimating approximately $30 million to treat all the soils at Operable Unit B1 above the established cleanup levels.

The last alternative I would like to present is on-base treatment. This is probably the most desired solution to the situation at Operable Unit B1. However, there are not any technologies currently available to efficiently and cost-effectively treat the soils at Operable Unit B1.

The cost estimate listed on this slide is based on on-site incineration, which is the only technology currently available demonstrated to treat the soils at Operable Unit B1 ansate.

However, incineration has been proved to be difficult to permit in the State of California. There are technologies emerging that have the potential to treat the soils at Operable Unit B1; however, these technologies have not been adequately demonstrated to date.

Having presented the first six alternatives for treatment of the soils at Operable Unit B1, I would like to turn the floor over to Elaine Anderson, who will present the McClellan Air Force Base preferred alternative.

MS. ANDERSON: Thanks, Tad.

As Tad said, my name is Elaine Anderson, and I'm the Remedial Project Manager for Operable Unit B. I've been working in Operable Unit B for almost three years now, and I've taken over B1, as Tad has gone on to some other projects.

My objectives tonight are to use the last few minutes of this presentation to go over the McClellan Air Force Base preferred alternative and to discuss our reasons for this choice.

Our preferred alternative is capping with continued treatability studies, with the potential for on-base treatment.

Our proposal is to remove the contaminates leading from OU B1 and relocate them ~~ansate.~~ on-site. We also propose to remove any of the soils in the lower half of lot above the 10 part per million cleanup level, and place them in the upper half of the lot where the contamination is higher.

We will then cap the entire site with asphalt. This is a somewhat more conservative requirement than we have with our 10 part per million cleanup level, but we feel that this better meets the DRMO objectives of future use of the site. And you can see on this chart here that by capping, which is in the blue stripes, the remainder of the area is already asphalted.

We will be effectively covering all of the PCB contamination we found from zero on up.

The proposal is to put an approximately two-inch layer of asphalt on top of a graded bed of gravel. Currently, most of the lot is covered with a perforated steel planking. Our proposal is to evaluate the option of removing and decontaminating that planking prior to the capping action. We prefer to do this, because we feel it will make the site easier for future remediation, but we do need to evaluate whether we're going to be able to decontaminate that planking prior to removing it.

The cap that we're calling a cap in this case is an asphalting of the lot. This is different than the cap we've talked about previously in Operable Unit D. That cap has several layers of fill material, including a plastic liner and an impermeable top. We feel that asphalt will be sufficient for OU B1 do to the nature of these contaminants.

We have an inert shallow contamination problem of a relatively nonvolatile and immobile contaminant, which is not the case in OU D.

And we chose this alternative because we feel it's effective as an interim measure. It meets the criteria of reduced risk -- the first criteria, which is protection of human health and the environment. It also is easily implementable, in that we feel we can do this quickly with a proven technology, and it's cost-effective.

It also gives us the option to treat the soils in the future. As Tad said, we're committed to looking for a long-term solution, and that's treatment.

As part of this proposal, we will continue these technology evaluations, and we will be submitting a report yearly to the agencies documenting the work we have done to that point, and the progress we've made on finding this long-term solution.

And we prefer this alternative to capping alone, because it does give us that option to treat the soils. We prefer it to excavation, as Tad said, because that's not a solution to the problem and it relocates it to another site. And we prefer to any of the treatment options, because at this point incineration is the only option available that will treat all of the contaminants and it's cost prohibitive.

We are currently looking at five groups of treatment options. The first is an extraction of the contaminants from the soil, followed by destruction or disposal; stabilization, solidification, chemical treatment, biological treatment, and thermal destruction.

Incineration is a form of thermal destruction, but we feel there are other emerging technologies that fall into this category that would bear looking at.

Giving that we have public support coming out of this meeting, we would propose to start the capping action no later than October of this year. We'd like to look at expediting that schedule as much possible, in that we're committed to getting this cap installed as soon as possible before the rainy season hits.

And we would start our evaluation of the treatment options in '94.

As Tad said, we've done an extensive investigation in Operable Unit B1 identifying the nature of the contaminants, type of contaminants and their extent. We spent several months looking into the options that we feel would apply to this site, and we think that our proposal combines the best elements of these options.

And I'll turn the floor back over to Fran for any discussion.

MR. SLAVICH: Okay. Well, that is a real quick-and-dirty nutshell of where we've come. And you've just heard about a year's, a year and a half's worth of effort getting to this point.

And what we'd like to do now is, if there are any questions or comments that you wanted to make on the preferred alternative, we will take those. Yes.

MR. BARTON: My name is Clyde Barton, Rio Linda.

There's something I may have not understood in the lady's thing here, when she was talking about contaminants and why they're just going to cap it.

And she said it was over rock and shale, you know, some porous material. Does this have any chance of migrating away from the site, or has it already migrated?

MS. ANDERSON: No. We would be putting the gravel bed on top of the contaminated soil and asphalt on top of it. The asphalt layer will help tremendously in keeping it from migrating, because the rain will now be draining off the site. But this contamination is also very nonmobile. As ~~tad~~ Tad showed, there's only one area where it's very --

(Thereupon, the reporter requested the speakers to speak up.)

MS. ANDERSON: Yes. Predominantly, it's in the upper six inches of soil, so we don't anticipate it's going to travel much more, and the cap should even further enhance that nonmobility.

MR. SLAVICH: Just to recap, the question was concerned about having the gravel layer underneath the asphalt, and will that allow the contaminants to move from the site. And we're saying, no. The reason we want to cap this site is because the contaminants move with soil particles. So, when it rains and the soil washes off the site, the contaminants wash off into the drainage ditches. So, as Elaine said, if you look over here on this poster board, we're going to be excavating the soils in those drainage ditches associated with Operable Unit B1, putting that soil on Operable Unit B1, and then covering it, so that we can prevent any further migration.

And that's exactly why we want to do this before the rainy season starts.

Yes?

MR. TAYLOR: My name is Burl Taylor. I'm the county public representative. I had a question. The cost is $2 million for the cap, right?

MR. SLAVICH: Two, was it two and a half million for the cap? Two for the cap, yes.

MR. TAYLOR: And during the study period, would that area be used?

MR. SLAVICH: Yes. The question is, during the study period, will that area be used? We're proposing to cap the site in a sequential manner so that the DRMO can continue to operate. So, we would take one section of it and work on that section, while DRMO is using the rest of the site, and we'll leapfrog around the site, moving the equipment from section to section.

So, we do want to keep them in operation while we're doing the remedial action. And, of course, we would have to have all kinds of monitoring in place to make sure that we're not going to expose anyone, and protect the worker safety. All of that will be part of that.

Did that answer your question?

MR. TAYLOR: It answers my question, but I'm not sure --

MR. SLAVICH: Say again?

MR. TAYLOR: I'm not sure if that two-inch cap is going to be sturdy enough to do any equipment moving.

MR. SLAVICH: Right. The question's whether or not the cap will be sturdy enough. Actually, it is going to be designed so that forklifts and heavy equipment can run over it. That's part of the design criteria. So, it has to be able to withstand all the operating functions that DRMO currently does. So, we are taking that into account.

We're basically talking about almost a roadway, paving the site with just a little bit better design, a little sturdier. Any other questions, comments?

Yes.

MR. YARBROUGH: My name is Chuck Yarbrough, City of Sacramento.

Anyhow, I would like to ask the question: Besides for the drainage ditch, what was the decision -- why was the decision made to dig up the other areas and incorporate them into the main area, you might say? There's two areas besides the drainage ditch, right?

MR. SLAVICH: Correct. The question is, why are we going to consolidate some of the other soils -- the drainage ditches, and there's also some other outlying areas in Operable Unit B1. Why are we going to take that soil and move it over to Operable Unit B1?

And the reason is that it's the most practical and effective way to do it. If we don't consolidate the soils in one area, then we'll have separate capping actions, potentially, in more than one area. And also, if we can't do that, then we would potentially have to take some of the soils that we wanted to consolidate and dispose of it off base. And we don't want to do that either. We'd like to take all of the contaminated material, put it in one place, cap it, and evaluate technologies so that, if we do come up with a way to treat the contaminants, then it would all be there in one place and easier to handle then.

MR. YARBROUGH: So, those areas are outside the capped area?

MR. SLAVICH: Well, the drainage ditches certainly are. And we're going to be taking any of the soils or the sediments from the drainage ditches and moving them over to Operable Unit B1. There is another area associated with Operable Unit B1. Let's see, where is it?

MR. DEAN: Right over there.

MR. SLAVICH: We have some outlying areas of contamination, that because of the way the site is set up, we don't want to end up paving all of McClellan, so we're trying to also keep some cost-effectiveness into the action also. So, it's easier and more cost-effectiveness to take this soil and move it over here than to try to extend the entire cap over the whole area.

MR. YARBROUGH: So, the cap is coming right to the shaded area right there?

MR. SLAVICH: The blue shaded area is the extent of the cap.

MR. YARBROUGH: Thank you.

And just what areas are you planning on moving over there that are outside, except for the channel?

MR. SLAVICH: Well, I'll tell you what. I'll let Elaine answer that.

MS. ANDERSON: The question was why are we moving some of the other soils that are not within -- one of the areas that we're looking at -- we have a couple of shallow areas greater than 10 parts per million in the lower half of the lot. We feel if we move these up to the upper half, we will be below the cleanup level. And potentially in the future, DRMO has some plans to put another building down here. When they go to put that building in, they won't be needing to warn you about the contamination down here, because we will below the cleanup level criteria. That's one of the reasons we're moving up here.

There was a section in here (indicating) in this area that we moved, because part of the conforming facility had some roadways that needed to be going through here. And since it was such a small area of contamination, we could basically clean up this area off to the east by moving those soils back over here. And this area (indicating) is now clean.

So, that's why we're moving some of them.

MR. YARBROUGH: Could you show me the areas that you're planning on moving?

MS. ANDERSON: Yes. If you'll come up and look afterwards, I think you'll be able to see it clearer. But there's an area here where there's yellow, signifying we have a 10 to 100 part per million contamination level. This is one of the areas that we are going to consolidate. And there's a little area down in the southern part of the DRMO lot itself that we'll be moving up farther.

MR. YARBROUGH: Are those areas to the right there going to be consolidated? Way over.

MS. ANDERSON: This area here under the hatching is currently paved. This is part of what we call the boneyard, it's where CE stores quite a bit of their equipment. And this hatched area is already paved. So, it's already covered. And we won't be digging it up now, no.

MR. YARBROUGH: What about the area to the north?

MS. ANDERSON: Again, this area that's in a box that's hatched with blue, we will be paving. The entire rest of this area is already paved.

MR. YARBROUGH: And that stuff to the south there that you're talking about, right in there, where you have your new building, that you're going to pave? You're just going to move it and pave it; is that it?

MS ANDERSON: Yes. We'll move what's above the cleanup level of 10 part per million; we will still be paving this entire lot, though, because that meets DRMO's requirements better, future use with the forklifts and their need --

MR. YARBROUGH: (Interjecting) You're going to pave over where the building's going; is that right?

MS. ANDERSON: At this point, yes, because that's a couple of years down the road, and they're not exactly sure yet. It's a plan. It's not finalized. We need to go ahead with the paving at this time.

MS. HART: I'm Stella Hart, chief of DRMO. And they held back the funds on that building awaiting an outcome of the BRAC Commission.

So, now that we've been taken from the closure list, they may give the authority to proceed with that building.

MS. ANDERSON: We feel it's prudent to go ahead at this point to cap it, because it's not something they have in mind in the next few months, six months, a year even.

MR. ROGERS: I'm Bob Rogers from Sacramento. My question is: During the excavation of the drainage canal, is there any possibility of airborne particles, contaminants being airborne at that time?

MS. ANDERSON: There is a possibility. We're going to be doing continuous monitoring and looking at dust suppression levels. And contamination was 18 part per million, the highest we found. It was lower than anything we found in our, quote, "hot areas" of the base. So, they're going to be doing continuous monitoring and dust suppression control measures during removal of soils.

MR. ROGERS: So, there is a possibility of airborne particles, contaminants, during the excavation period of the drainage canals?

MR. SLAVICH: Yes, there is a possibility of dust being emitted. But, as Elaine said, we have to monitor the air with instruments while we're doing the remedial action. And if the levels get above a certain criteria, then they have to stop the action to prevent continued dust emissions. So, there is a level that they'll be monitoring. If it gets above that, then you have to stop, take some more measures to make sure you're doing a better job of keeping the dust down. And that is part of the remedial action plan that will be produced once this is finalized.

Yes, Chuck?

MR. YARBROUGH: Charles Yarbrough again, or Chuck Yarbrough from the City of Sacramento. I'm your public representative.

Anyhow, I wanted to say that that was one of my main concerns, was the dust. And I want to go on record as saying that. And also, my other concern was -- they're going to wet ~~set~~ it down, okay, supposedly. And I don't want it to get so wet that it's going to wash any PCB in the soil down the drainage canal, and then into Magpie Creek either. I wanted that on the record.

MR. SLAVICH: So, the two main points -- if this gets community acceptance -- is when we're implementing the cap, to make sure that we have a handle on dust suppression and also to make sure that by doing that, we don't make the problem worse and have soils run off the site, which, again, is why we want to do this before the rainy season, because we don't want the soils to run off.

And we're also, as I said, going to be doing it in a stepwise fashion. We're not going to remove the whole area and expose all of that to potential drainage. It will be done one section at a time, so we do minimize what is available for dust.

MR. YARBROUGH: One other thing. I would like to see you keep the cap that's on it now, so in case you get into the middle of the rainy season -- you know, rains that you unexpectedly -- with all these volcanos going off -- if they come in early this year, that you would have that material available to cover -- that is, the cap that's on there now -- to cover any open areas that you're presently working with to put the new cap on.

MR. ROGERS: Bob Rogers again. I guess what we're basically -- both of us discussing here -- do you also have a backup program for this in case you do get into the rainy season, in case you do get airborne particles? I mean, are you going to have a secondary program that you can resort to, so that you don't get caught dead in the water?

MR. SLAVICH: Yes. The answer is, yes. When the contractor or whoever is going to be actually doing the paving, before they even set foot and start working on the site, they have to be able to tell us -- and we have to be able to concur -- how they're going to do the action. What happens if it rains? What are they going to do? How are they going to control the dust? How are they going to monitor to make sure that they're controlling the dust?

What if something happens? What are their emergency measures? Who do they contact? All of those things have to be planned upfront or you can't even start the action.

And to address Mr. Yarbrough's concern, the shaded area's where we already have an impermeable liner over the area of highest contamination. That's already in place right now. And the strategy is to cap that first. And that's the hot spot, the highest contamination. You want to do that first.

Then, we will evaluate -- we're not just going to take that impermeable liner and throw it away. So, that's really a good suggestion to keep that available for -- once you move to another area, if it does start raining, you can put that done, cover it up, and you have a stopgap measure.

So, that's a good comment. Yes?

MR. MILLER: Frank Miller, former base bioenvironmental engineer.

Elaine mentioned about the considerable earth moving that will take place, and especially the dredging of the channels in the drainage ditches. Well, has anybody evaluated the upset of the natural flow through the area from heavy rains? Won't that upset that flow and also on base, with consolidating earth, that will also change the flow.

I'm concerned about that. And then erosion through that, extensive erosion because of the excavations.

MR. SLAVICH: Okay. So, to repeat that, you're concerned about -- we're looking at the drainage ditches. By taking remedial action, we could be increasing the potential for erosion when it rains, and also --

MR. MILLER: Upset the natural flow through that whole area. How deep do you plan to excavate those drainage ditches? Because then you're going to have low spots, and it'll have to go uphill, and that area's natural flow will be upset.

MR. SLAVICH: Well, I do know that, as part --

MR. ROGERS; (Interjecting) You know, the high spots and the low spots on the site, that's also going to add to the upset.

MR. SLAVICH: Well, as far as -- okay. One point at a time. As far as the site goes, before the cap gets put in place, the surveyors and the civil engineers will have to take -- not the on-base civil engineers, but the contractor that does the action will have to make sure that they surveyed out the site and they do the cut-and-fill procedure to get adequate drainage when they actually install the cap.

For the drainage ditches themselves, we're not talking about excavating an incredible amount of soil. We're looking at, you know, maybe a foot, six or twelve inches, not a whole lot of soil. So, I don't think we're going to be affecting the overall flow characteristics of the drainage ditches. However, we will evaluate that and have to look at it. Also, we'll have to evaluate the potential impacts of downstream. Magpie Creek is an ecosystem. We have to evaluate what our remedial action is going to do. We can't just dredge out the whole channel and have a bunch of, you know, erosion going into Magpie Creek and messing that up, too.

So, we have to take ecosystem effects into account also. Does that answer your question or not? Your concern is to make sure that, in our remedial action, we address those issues?

MR. MILLER: Well, I would think that before you would plan to cap, you would do an evaluation as to the way that -- the way the water's going to flow off that land. I mean, you're putting the horse before the cart, so to speak.

You know, in other words, going ahead and doing the cap, getting all the equipment out there, the contract is let, and doing the cap, and then trying to sort through this flow problem while you're building the cap.

MR. SLAVICH: Okay. That's a good comment; that we're not taking into account the drainage of the site before we do the cap. And I think we do have a really good handle on that, which is that we have the drainage lines. We understand how the drainage happens, and that's how the drainage ditches got contaminated in the first place, because it does run off in the direction that you see there.

And we've actually been out during the rainy portions doing our sampling to make sure that our impermeable liner is doing what it's supposed to do, preventing contaminant runoff. So, we have been out there observing the actual runoff from the site. So, I think we understand that pretty well.

Any other comments, questions?

MR. CALLOWAY: Del Calloway. I have a question on monitoring the cap after you put it on. I'm acquainted with some of the equipment that goes in and out of the yard, and a semitruck of 32,000 pounds per axle or double axles have a tendency to push the blacktop ahead of them, so cracks will open up. Do you have a plan for monitoring those cracks? Where would that information be kept?

MR. SLAVICH: Yes. The question is: After we get the cap installed -- assuming that's what we do -- do we have a plan for the long-term operation and maintenance? And the answer is,yes. In fact, in the next year's budget that we're putting together right now, we have a project identified. And it's called, "Operable Unit B1, long-term operation and maintenance."

And periodically -- there's several parts to it. We have to monitor surface water runoff to make sure that the cap is preventing contaminants from running off. That's one part of it. We also have to monitor the cap itself, check for integrity. If there are cracks, then we have to get out there and patch them and fix them. And that's a continuous requirement, which will be met as long as the cap is in place.

MR. CALLOWAY: Whose responsibility will that be?

MR. SLAVICH: That's our responsibility, McClellan's. Any other questions?

MR. YARBROUGH: I take it that, as far as the channel goes, you're going to backfill? When you dig it out, you're going to backfill?

MR. SLAVICH: I don't know the answer to that. Elaine? I don't believe we are planning on backfilling, because there's not, as I said, not a lot of excavation that's going to be happening.

MR. ANDERSON: The first part of the drainage that comes off of OU B1 is gunite lined. So, essentially, what we're doing is pulling the soils out of here that migrated off the site. It's after you reach Building 781, in this area, it reverts to just soils. And, as Fran said earlier, at this point, we're not looking at removing a lot of soils. The contamination was highest in the drainage just off site, and it drops off until it hits nondetect at Magpie Creek.

So, I don't think we're talking about a lot. If it turns out we do have to remove a lot, then we'd need to take care of it.

And we need to be out there testing these soils deeper to make sure we don't excavate more than we need to.

MR. MILLER: You said as much as a foot.

MS. ANDERSON: It could be as much as a foot, yes.

MR. SLAVICH: And so, the question was if we were going to backfill after we remove some of the soils from the drainage ditches. And I guess the answer is, if it's necessary, then we will do that. There's nothing that precludes us from doing that.

But at this point, we're not planning on it, because we don't believe that it's going to be a large amount of soil that needs to be removed. If that's the case, then we'll have to backfill it and compact it. Yes?

ELDER GAINES: My name is Mannard Gaines. I'm a pastor of church near the base, and I was wondering when you were talking about capping -- I was wondering will you still monitor Magpie Creek, and will you still check the water that runs through that?

MR. SLAVICH: The question is, will we still monitor Magpie Creek? The answer is, yes, we will. In fact, we monitor it from several different locations. We have a groundwater treatment plant that discharges into Magpie Creek, so we take samples there pretty frequently.

And, as I said before, after we get the cap in place in Operable Unit B1, we have to take samples when it rains to monitor the runoff for contaminants. So, we will be doing that.

MR. TAYLOR: Part of the area's already capped.

Is it the same grade of capping that you're going to use?

MR. SLAVICH: No. I do not believe so. So, any other areas will have to be brought up to the same level or the same standard of the other capped areas would be. The question being the grade of the asphalt that's currently in place. So, they will have to be standardized.

MR. TAYLOR: You're speaking of the quality.

MR. SLAVICH: The quality, yes.

The quality will have to be the same across the site. Anything else?

Okay. We really appreciate you coming. And, as we said before, all of these comments have been taken down and they will be addressed in what's called the -- in a written format that's called the responsiveness summary, which will come out in -- about a month from now.

The public comment period formally closes July 16th, so it's little over two weeks from now. You have until July 16th to provide written comments. If you need comment paper, just see Debbie Heindel in the back. So, this isn't your only opportunity. This is just a public forum, an opportunity to come and hear about what we're doing.

If you know of anybody that wanted to come to the meeting tonight, but could not, you can do back and tell them what you heard, give them a comment sheet, and they can write it in, send their comments to us. Again, you have until July the 16th to do that.

Are there any final questions? Okay. Thank you very much.

(Thereupon, the hearing was adjourned at 8:20 p.m.)

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CERTIFICATE OF SHORTHAND REPORTER

--oOo--

This is to certify that I, Nadine J. Parks, a shorthand reporter of the State of California, am a disinterested person herein; that the foregoing hearing was reported in shorthand writing by me, and thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney to any of the parties to said hearing, nor am I interested in the outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 7th day of July, 1993.

Nadine J. Parks

Nadine J. Parks
Shorthand Reporter

ATTACHMENT C

McCLELLAN AFB
OU B ADMINISTRATIVE RECORD (AR) INDEX
(1979–1993)

The McClellan Air Force Base (AFB) Administrative Record (AR) index is arranged in a column format as shown in the following index. The index is designed to help you locate AR documents on microfilm. Documents are listed in the index according to their title (or subject) and are in alphabetical order. These entries are also arranged in chronological order according to their document date.

For your convenience, a detailed description of the contents of each column of the index is described below. Note that many entries in the index are abbreviated. The Key Word List is also provided, giving definitions of AR index abbreviations, and can assist you in looking up documents on the index.

SECURITY CLASS

This column identifies the AR.

AUTH FIRM (Author Firm)

This column refers to who wrote the document and their company, affiliation, or group. This information will be abbreviated (see the Key Word List).

RECIP FIRM (Recipient Firm)

Refers to who received the document and their company, affiliation, or group. This information will be abbreviated (see the Key Word List).

TITLE

This column shows a condensed title or description of the document. Documents are listed in alphabetical order. Some parts of the title or description may be abbreviated (see the Key Word List).

DOC DATE (Document Date)

This is the date the document was generated. Dates are listed in chronological order (most recent shown first) according to the title or description.

DOC CAT (Document Catalog)

This column identifies the category of documents as established by the United States Environmental Protection Agency (U.S. EPA). The numbered document categories are:

CATEGORY OF DOCUMENTS

1.0 SITE INVESTIGATION (SI)

- 1.1 Background — Resource Conservation and Recovery Act (RCRA) and other information
- 1.2 Notifications/SI Reports
- 1.3 Preliminary Assessment (PA) Reports
- 1.4 SI Reports
- 1.5 Previous Operable Unit Information

2.0 REMOVAL RESPONSE

- 2.1 Sampling and Analysis Plans (SAPs)
- 2.2 Sampling and Analysis Data/Chain-of-Custody Forms
- 2.3 Engineering Evaluation/Cost Analysis (EE/CA) Approval Memoranda
- 2.4 EE/CA
- 2.5 Action Memoranda
- 2.6 Amendments to Action Memoranda

3.0 REMEDIAL INVESTIGATION (RI)

- 3.1 SAPs
- 3.2 Sampling and Analysis Data/Chain-of-Custody Forms
- 3.3 Work Plans
- 3.4 RI Reports

4.0 FEASIBILITY STUDY (FS)

- 4.1 Applicable or Relevant and Appropriate Requirements (ARARs) Determinations
- 4.2 FS Reports
- 4.3 Proposed Plans
- 4.4 Supplements and Revisions to Proposed Plans

5.0 RECORD OF DECISIONS (RODs)

- 5.1 RODs
- 5.2 Amendments to RODs

6.0 STATE COORDINATION

- 6.1 Cooperation Agreements
- 6.2 State Certification of ARARs

(Continued)

CATEGORY OF DOCUMENTS (Continued)

7.0 ENFORCEMENT

- 7.1 Enforcement History
- 7.2 Endangerment Assessments
- 7.3 Administrative Orders
- 7.4 Consent Decrees
- 7.5 Affidavits
- 7.6 Documentation of Technical Discussions on Response Actions
- 7.7 Notice Letters and Responses

8.0 HEALTH ASSESSMENTS

- 8.1 Agency for Toxic Substances and Disease Registry (ATSDR) Health Assessments
- 8.2 Toxicological Profiles

9.0 NATURAL RESOURCE TRUSTEES

- 9.1 Notices Issued
- 9.2 Findings of Fact
- 9.3 Reports

10.0 PUBLIC PARTICIPATION

- 10.1 Comments and Responses
- 10.2 Community Relations Plan (CRP)
- 10.3 Public Notice(s) (e.g., availability of the AR file, availability of proposed CRP, and public meetings)
- 10.4 Public Meeting Transcripts
- 10.5 Documentation of Other Public Meetings
- 10.6 Fact Sheets and Press Releases
- 10.7 Responsiveness Summaries
- 10.8 Late Comments

11.0 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS

- 11.1 EPA Headquarter Guidance
- 11.2 EPA Regional Guidance
- 11.3 State Guidance
- 11.4 Technical Sources

DOC TYPE (Document Type)

This column identifies the document type, such as a letter, memo, or report. The document type information will be abbreviated (see the Key Word List).

ROLL-FRAME

This column provides the microfilm roll number of the document (e.g., ANON31-3). Note, if this field is blank, the document has not yet been microfilmed.

MANUAL SEARCH #

This last column provides the numbered location of the document on microfilm. Note, if this field is blank, the document has not yet been microfilmed.

McClellan AFB Key Word List

AFB	Air Force Base
ANDS	Analytical and Data Sampling
ANON	AR Non-Confidential
AR	Administrative Record
BRAF	Brooks Air Force Base
COS	County of Sacramento
DHS	Department of Health Services/Public Health/County Health
DIST	Distribution (general)
DTSC	Department of Toxic Substances Control (also see DHS)
EECA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
ERA	Expedited Removal (Response) Action
FONSI	Finding of No Significant Impact
GOVT	Legislature/Congress/House of Representatives/Governor/Assembly California Legislature
IRP	Installation Restoration Program
LTR	Letter
MAFB	McClellan Air Force Base
MEMO	Memo
MESS	McClellan Ecological Seepage Situation
NON-	Nonconfidential
OU___	Operable Unit ___ (add the specific Operable unit letter)
QAPP	Quality Assurance Program Plan
QAQC	Quality Assurance/Quality Control
RAD	Radian Corporation
RESI	Residents
RPT	Report
RWQC	Regional Water Quality Control/Water Resources Control Board/Water Resources Department
USAF	United States Air Force/Defense Logistics Agency
VEND	Vendor (contractors, labs, etc.)

URITY ASS	AUTH FIRM	RECIP FIRM	TITLE	DOC DATE	DOC CAT	DOC TYPE	ROLL-FRAME	MANUAL SEARCH#
AR NON-	RAD	MAFB	ADDENDUM II-HEALTH AND SAFETY PLAN FOR SOIL GAS INVESTIGATION	12-01-91	3.3	RPT	ANON39-22	0832
AR NON-	RAD	BRAF	ANALYTICAL HISTORY OF WELLS SAMPLED	06-01-90	1.5	ANDS	ANON31-3	0714
AR NON-	RAD	MAFB	APPENDIX A-OUB RI SITE CHARACTERIZATION SUMMARY-SOIL RESULTS	02-19-93	3.4	RPT		
AR NON-	GOVT	MAFB	CONNELLY TO TROGDEN REGARING OUB CONTAMINTED GROUNDWATER REMOVAL	03-05-91	10.1	LTR	ANON36-164	3281
AR NON-	RAD	MAFB	DISTRIBUTION OF DRAFT BACKGROUND CONSENSUS STATEMENT	11-02-92	11.4	LTR		
AR NON-	MAFB	MAFB	DRAFT PROPOSED PLAN FOR OUB1 REMEDIAL ACTION	04-29-93	3.4	LTR		
AR NON-	MAFB	MAFB	ENVIRONMENTAL ACTION UPDATE	01-01-91	10.6	NLTR		
AR NON-	MAFB	MAFB	ENVIRONMENTAL ACTION UPDATE	04-01-91	10.6	NLTR		
AR NON-	MAFB	MAFB	ENVIRONMENTAL ACTION UPDATE	01-01-92	10.6	NLTR		
AR NON-	MAFB	DIST	FINAL TECHNICAL MEMORANDUM-STEAM INJECTION/VACUUM EXTRACTION PHASE II TREATABILITY INVESTIGATION-SITE CHARACTERIZATION AND DESIGN	12-06-91	3.4	MEMO	ANON35-78	5098
AR NON-	RAD	BRAF	GOUGE TO HAAS/THOMPSON REGARDING FINAL DECISION DOCUMENTS	03-07-91	5.1	LTR	ANON24-42	1241
AR NON-	MAFB	DIST	IERARDI TO DISTRIBUTION REGARDING QUALITY ASSURED DATA OR DOCUMENTS FOR OUB ACTIVITIES	12-24-91	7.7	MEMO	ANON35-94	5214
AR NON-	IHS	MAFB	LANDIS TO FINDLEY REGARDING EXTENSION FOR REVIEW OF OU B RI SAP WORKPLAN	05-07-91	7.7	LTR		
AR NON-	IHS	MAFB	LANDIS TO IERARDI REGARDING DRAFT PRELIMINARY ASSESSMENT REPORT	06-01-90	3.4	LTR	ANON22-15	0131
NON-	IHS	MAFB	LANDIS TO IERARDI REGARDING PROPOSAL/NOTIFICATION FOR AN EXPEDITED REMOVAL ACTION	02-08-90	2.6	LTR	ANON22-85	5056
AR NON-	IHS	MAFB	LANDIS TO IERARDI REGARDING REVIEW OF OUB ENGINEERING EVALUATION COST ANALYSIS DRAFT REPORT	11-30-90	2.4	LTR	ANON32-70	4994
AR NON-	IHS	MAFB	LANDIS TO ROBBINS REGARDING ABGOURI TRANSPORTATION AND DISPOSAL PLAN	10-16-89	2.4	LTR	ANON22-5	0099
AR NON-	RWQC	MAFB	MACDONALD TO IERARDI REGARDING OUB EECA COMMENTS	11-29-90	2.4	LTR	ANON16-37	3324
AR NON-	RWQC	MAFB	MACDONALD TO IERARDI REGARDING PCB SECOND COLUMN ANALYSIS FOR OUB RI	01-28-92	7.6	LTR		
AR NON-	EPA	MAFB	MENDOZA TO ANDERSON REGARDING COMMENTS ON VADOSE MODELING LETTER	03-12-92	10.6	LTR		
AR NON-	MESS	MAFB	MESS TO TROGDON REGARDING PUBLIC COMMENT FOR OUB REMOVAL ACTIONS	03-11-91	10.1	LTR	ANON36-184	3429
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING COMMENTS TO SUMMARY OF QAPP REVISIONS AND ANALYTICAL PROCEDURES FOR OUB FIELD WORK	10-31-91	3.4	LTR	ANON35-96	5221
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING EPA REQUIREMENT OF ADDITIONAL REVIEW TIME FOR OUB RI	05-02-91	7.7	LTR		
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING OUB EECA-OCTOBER 1990	11-29-90	2.4	LTR	ANON32-45	3427
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING OUB REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN DRAFT REPORT	05-02-91	7.7	LTR	ANON35-93	5212
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING OUB REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN	06-06-91	3.1	LTR	ANON35-89	5134
AR NON-	EPA	MAFB	MITANI TO IERARDI REGARDING OUB REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN	09-30-91	7.7	LTR	ANON35-98	5230
NON-	EPA	MAFB	MOORE TO SLAVICH REGARDING COMMENTS ON CONSENSUS STATEMENT	02-01-93	7.7	LTR		
NON-	EPA	MAFB	MOORE TO SLAVICH REGARDING DRAFT CONSENSUS STATEMENT FOR SOILS	12-14-92	7.6	LTR		
AR NON-	EPA	MAFB	MOORE TO SLAVICH REGARDING PROPOSED FRAMEWORK FOR JUSTIFYING BASEWIDE SOIL BACKGROUND CONCENTRATIONS	08-17-92	7.7	LTR		

SECURTY CLASS	AUTH FIRM	RECIP FIRM	TITLE	DOC. DATE	DOC. CAT	DOC. TYPE	ROLL-FRAME.	MANUAL. SEARCH#
AR NON-	EPA	MAFB	MOORE TO SLAVICH REGARDING SCHEDULE REVISION TO OUB1	10-29-92	7.7	LTR		
AR NON-	NEWS	MAFB	NEWS-AIR FORCE DOUBLES TCE TESTING-OFFICALS SAY 65 WELLS WILL BE CHECKED FOR POLLUTION	04-05-84	10.6	NEWS	ANON36-82	1089
AR NON-	NEWS	MAFB	NEWS-MCCLELLAN TO DOUBLE NUMBER OF WELLS IT TESTS	03-04-84	10.6	NEWS	ANON36-83	1091
AR NON-	NEWS	MAFB	NEWS-REPAIRS BEGIN ON MCCLELLAN LEAKY PIPELINE BUT STATE HAS DOUBTS ABOUT NOVEL WAY OF FIXING AGING INDUSTRIAL WASTE-WATER SYSTEM	02-08-88	10.6	NEWS	ANON33-39	5391
AR NON-	DTSC	MAFB	OUB COMMENTS ON FIELD SAMPLING PLANS FOR NOV 1992	12-30-92	3.3	LTR		
AR NON-	RAD	MAFB	OUB EECA ENVIRONMENTAL ASSESSMENT LAYPERSONS SUMMARY	01-01-91	2.4	RPT		
AR NON-	RAD	RAD	OUB EECA-LAYPERSONS SUMMARY	01-01-91	2.4	RPT		
AR NON-	MAFB	DIST	OUB OUB1-IAG DELIVERABLE SCHEDULE	10-18-92	10.1	LTR		
AR NON-	RAD	BRAF	OUB-ACTION MEMORANDUM	04-01-91	2.5	RPT	ANON32-52	3616
AR NON-	MAFB	MAFB	OUB-ACTION MEMORANDUM	04-24-91	2.5	MEMO	ANON32-14	1796
AR NON-	RWQC	MAFB	OUB-ACTION MEMORANDUM AND FONSI	04-30-91	2.5	LTR	ANON38-49	2479
AR NON-	DHS	MAFB	OUB-ACTION MEMORANDUM REPORT	05-22-91	2.5	LTR	ANON32-35	2928
AR NON-	RAD	MAFB	OUB-APPENDIX A-OPERATION AND MAINTENENCE MANUAL-GROUNDWATER EXTRACTION AND TREATMENT FACILITY	08-01-91	4.2	RPT	ANON36-122	2097
AR NON-	RWQC	MAFB	OUB-B666-ERA-PROPOSAL/NOTIFICATION FOR AN EXPEDITED REMOVAL ACTION IN THE GROUND WATER	02-12-90	10.1	LTR	ANON16-11	1795
AR NON-	DTSC	MAFB	OUB-COMMENTS ON THE FIELD SAMPLING PLANS MAR 93	04-09-93	3.1	LTR	ANON39-19	0367
AR NON-	DTSC	MAFB	OUB-DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS ON DRAFT REMEDIAL INVESTIGATION HEALTH AND SAFETY PLAN	07-29-91	3.3	LTR	ANON35-109	5335
AR NON-	RWQC	MAFB	OUB-DESIGN BASIS CONTRACT DOCUMENTS AND SPECIFICATIONS FOR THE EXPEDITED REMOVAL ACTION FINAL DESIGN	07-03-90	3.4	LTR	ANON22-29	0175
AR NON-	RAD	MAFB	OUB-DESIGN BASIS FOR THE EXPEDITED REMOVAL ACTION-GROUNDWATER TREATMENT SYSTEM	06-29-90	4.2	RPT	ANON24-109	1883
AR NON-	DHS	MAFB	OUB-DHS COMMENTS ON DRAFT REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN	06-07-91	3.1	LTR	ANON35-91	5190
AR NON-	DTSC	MAFB	OUB-DRAFT FINAL REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN RESPONSE TO COMMENTS	10-29-91	3.1	LTR	ANON35-97	5227
AR NON-	MAFB	DIST	OUB-EECA AND ENVIRONMENTAL ASSESSMENT	01-29-91	2.4	MEMO	ANON37-74	3393
AR NON-	DHS	MAFB	OUB-EECA AND ENVIRONMENTAL ASSESSMENT	03-01-91	2.3	LTR	ANON32-71	5001
AR NON-	MAFB	MAFB	OUB-EECA DRAFT COPY	09-28-90	2.4	MEMO	ANON32-56	3686
AR NON-	RAD	BRAF	OUB-EECA ENVIRONMENTAL ASSESSMENT	02-01-91	2.4	RPT	ANON20-2	1417
AR NON-	RAD	MAFB	OUB-EECA ENVIRONMENTAL ASSESSMENT AND REMOVAL ACTION-FONSI	04-01-91	4.4	RPT	ANON24-113	4251
AR NON-	RAD	BRAF	OUB-EECA-FINDING OF NO SIGNIFICANT IMPACT-ENVIRONMENTAL ASSESSMENT AND REMOVAL ACTION	04-24-91	2.5	RPT	ANON25-9	2124
AR NON-	MAFB	DIST	OUB-ENGINEERING EVALUATION/COST ANALYSIS AND ENVIRONMENTAL ASSESSMENT	01-29-81	2.4	MEMO	ANON32-58	3697
AR NON-	DHS	MAFB	OUB-EXTENSION FOR REVIEW OF THE REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS WORKPLAN	05-07-91	3.1	LTR	ANON38-50	2431
AR NON-	RWQC	MAFB	OUB-FIELD SAMPLING PLAN	10-28-92	3.3	LTR		
AR NON-	RWQC	MAFB	OUB-FIELD SAMPLING PLANS	04-02-93	3.1	LTR	ANON39-18	0365

SECURITY CLASS	AUTH FIRM	RECIP FIRM	TITLE	DOC DATE	DOC CAT	DOC TYPE	ROLL-FRAME	MANUAL SEARCH#
AR NON-	DHS	COS	OUB-GROUNDWATER EXTRACTION PROGRAM	02-04-91	7.6	LTR	ANON32-69	4991
AR NON-	RAD	BRAF	OUB-LOCATIONS RECOMMENDED FOR NO FURTHER ACTION-DECISION DOCUMENT	03-01-91	5.1	RPT	ANON24-50	1343
AR NON-	RAD	BRAF	OUB-NO FURTHER ACTION DECISION DOCUMENTS	09-01-91	1.5	RPT	ANON32-68	4880
AR NON-	RAD	BRAF	OUB-OPERATION AND MAINTENANCE MANUAL FOR GROUNDWATER EXTRACTION AND TREATMENT FACILITY	08-01-91	3.3	RPT	ANON36-124	2919
AR NON-	RWQC	MAFB	OUB-PRELIMINARY ASSESSMENT SUMMARY REPORT	04-19-90	3.4	LTR	ANON22-9	0114
AR NON-	EPA	MAFB	OUB-PRELIMINARY ASSESSMENT SUMMARY REPORT-DRAFT COPY DATED 6 APR 90	06-15-90	11.2	LTR	ANON22-17	0136
AR NON-	MAFB	MAFB	OUB-PRELIMINARY ASSESSMENT SUMMARY REPORT-RESPONSE TO AGENCY COMMENTS	08-14-90	1.3	MEMO	ANON32-51	3543
AR NON-	RWQC	MAFB	OUB-PRELIMINARY DESIGN REVIEW FOR THE EXPEDITED REMOVAL ACTION	03-30-90	2.1	LTR	ANON22-80	5043
AR NON-	RAD	BRAF	OUB-PUBLIC REVIEW-EECA ENVIRONMENTAL ASSESSMENT	03-12-91	10.1	LTR	ANON32-59	3703
AR NON-	RWQC	MAFB	OUB-QAPP REVISION FOR REMEDIAL INVESTIGATION	09-04-91	3.3	LTR	ANON35-69	5034
AR NON-	MAFB	DIST	OUB-REMEDIAL INVESTIGATION	04-18-91	3.4	MEMO	ANON35-92	5207
AR NON-	MAFB	DIST	OUB-REMEDIAL INVESTIGATION DRAFT FINAL SAMPLING AND ANALYSIS PLAN	09-27-91	3.1	MEMO	ANON35-39	3660
AR NON-	MAFB	DIST	OUB-REMEDIAL INVESTIGATION MONTHLY STATUS MEETING	01-09-92	10.5	MEMO	ANON35-107	5250
AR NON-	MAFB	DIST	OUB-REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN	09-17-91	3.1	MEMO	ANON35-52	4977
AR NON-	RAD	MAFB	OUB-REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN	11-01-91	3.1	RPT	ANON36-193	3481
NON-	RWQC	MAFB	OUB-REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN-DRAFT FINAL	09-18-91	3.1	LTR	ANON35-99	5232
AR NON-	MAFB	DIST	OUB-REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN-FINAL	11-18-91	3.1	MEMO	ANON35-95	5216
AR NON-	RWQC	MAFB	OUB-REMEDIAL INVESTIGATION SAMPLING PLAN	04-03-91	3.1	LTR	ANON35-55	4983
AR NON-	MAFB	MAFB	OUB-REMEDIAL INVESTIGATION-HEALTH AND SAFETY PLAN	04-01-91	3.3	RPT	ANON34-50	5485
AR NON-	RAD	MAFB	OUB-REMEDIAL INVESTIGATION-HEALTH AND SAFETY PLAN	10-01-91	3.3	RPT	ANON39-23	0870
AR NON-	NESS	MAFB	OUB-REMOVAL ACTIONS	03-02-91	10.1	LTR	ANON16-13	1802
AR NON-	RWQC	MAFB	OUB-RESPONSE TO COMMENTS AND ERRATA MATERIALS-REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN-DRAFT FINAL	10-01-91	3.1	LTR	ANON35-72	5080
AR NON-	DHS	DHS	OUB-RESPONSE TO PROPOSAL FOR MANAGEMENT OF CUTTINGS FROM BORINGS DRILLED FOR THE REMEDIAL INVESTIGATION	05-30-91	3.4	MEMO	ANON35-90	5185
AR NON-	RWQC	MAFB	OUB-SAMPLING AND ANALYSIS PLAN ADDENDUM-FIELD SAMPLING PLANS	12-04-92	3.3	LTR	ANON38-57	2525
AR NON-	JACO	DTSC	OUB-SAP FOR BUILDING 243G	09-01-92	3.1	RPT		
AR NON-	RWQC	MAFB	OUB-SOIL GAS INVESTIGATION	07-27-90	3.4	LTR	ANON16-53	3375
AR NON-	MAFB	MAFB	OUB-SOIL GAS INVESTIGATION	10-23-90	3.4	MEMO	ANON35-108	5330
AR NON-	RWQC	MAFB	OUB-SOIL GAS INVESTIGATION SUMMARY REPORT	03-21-91	3.4	LTR	ANON35-67	5030
AR NON-	RAD	BRAF	OUB-VOL 1 PRELIMINARY ASSESSMENT SUMMARY REPORT	10-01-91	1.3	RPT	ANON32-119	5218
AR NON-	RAD	BRAF	OUB-VOL 2 PRELIMINARY ASSESSMENT SUMMARY REPORT	10-01-91	1.3	RPT	ANON37-72	2097
AR NON-	RAD	BRAF	OUB-VOL 3 PRELIMINARY ASSESSMENT SUMMARY REPORT	10-01-91	1.3	RPT	ANON33-4	2943
NON-	RWQC	MAFB	OUB1-DETECTION OF DIOXIN/PCB IN STORM WATER RUNOFF FROM DRMO	01-25-93	1.2	LTR		
AR NON-	MAFB	MAFB	OUB1-PROPOSED PLAN FOR INTERIM REMEDIAL ACTION FOR PCB CONTAMINATED SOIL	06-01-93	4.3	RPT		
AR NON-	VEND	MAFB	PICKER TO TROUDON REGARDING DISCHARGE OF CONTAMINATED AND UNTREATED	02-25-90	10.1	LTR	ANON36-163	3278

SECURTY CLASS	AUTH FIRM	RECIP FIRM	TITLE	DOC DATE	DOC CAT	DOC TYPE	ROLL-FRAME	MANUAL SEARCH#
			GROUNDWATER INTO SANITARY SEWERS					
AR NON-	EPA	MAFB	PRELIMINARY ASSESSMENT SUMMARY REPORT	09-19-90	1.3	LTR	ANON16-32	3308
AR NON-	MAFB	DIST	REMEDIAL INVESTIGATION SCHEDULE	07-18-91	3.3	MEMO	ANON35-110	5345
AR NON-	RWQC	DISC	REQUEST FOR APPLICABLE OR RELEVANT AND APPROPIATE REQUIREMENTS FOR ACTIONS	03-11-93	4.1	LTR		
AR NON-	RWQC	MAFB	REQUEST FOR TECHNICAL VARIANCE-EXTRACTABLE TOTAL PETROLEUM HYDROCARBONS/PCB SECOND COLUMN ANALYSES FOR MAFB	01-28-92	3.4	LTR		
AR NON-	RAD	BRAF	SOIL REMEDIAL TECHNOLOGIES SCREENING TECHNICAL MEMORANDUM	01-01-92	3.4	RPT	ANON32-8	1095
AR NON-	MAFB	DIST	THE CLEANUP SCHEDULE NUMBER 2	07-01-90	10.6	NLTR		
AR NON-	MAFB	MAFB	THE FACTS NUMBER 9	06-01-91	10.6	NLTR		
AR NON-	RWQC	MAFB	UNDERGROUND STORAGE TANK PROGRAM/ADDITION OF ARARS	11-19-92	7.6	LTR		
AR NON-	RAD	BRAF	VOL 1-OUB-SOIL GAS INVESTIGATION QAQC REPORT	02-01-91	3.4	RPT	ANON16-3	1239
AR NON-	RAD	MAFB	VOL 2-OUB RI SITE CHARACTERIZATION STUDY	10-01-92	3.4	RPT		
AR NON-	RAD	BRAF	VOL 2-OUB-SOIL GAS INVESTIGATION QAQC REPORT	02-01-91	3.4	RPT	ANON16-55	4712
AR NON-	RAD	MAFB	VOL 2-SOIL/DEBRIS MANAGEMENT PLAN-APPENDICES	12-01-91	3.3	RPT		
AR NON-	RAD	MAFB	VOL 3-OUB-SOIL GAS INVESTIGATION QAQC REPORT	02-01-91	3.4	RPT	ANON21-3	2331
AR NON-	USAF	GOVT	WISE TO CRANSTON REGARDING OUB EECA ENVIRONMENTAL ASSESSMENT FOR IRP	03-04-91	2.4	LTR	ANON32-57	3691
AR NON-	RESI	MAFB	YARBROUGH TO TROGDON REGARDING OUB EECA ENVIRONMENTAL ASSESSMENT	03-01-91	10.1	LTR	ANON36-185	3434

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ATTACHMENT D

RESPONSE TO AGENCY COMMENTS

OU B1 DRAFT ROD Response to Comments

REGIONAL WATER QUALITY CONTROL BOARD COMMENTS

Comment 1, Page II-11

COMMENT SUMMARY: It should be noted that surface water samples were collected prior to liner installation. Additional sampling efforts should be referenced.

Response:

The text has been edited to reflect this comment.

Comment 2, Page II-14, Second Bullet

COMMENT SUMMARY: Same comment as number 1, above.

Response:

The text has been edited to reflect the comment.

Comment 3, Page II-16, Second Column, Paragraph 3

COMMENT SUMMARY: The second sentence is incomplete.

Response:

The sentence has been completed.

Comment 4, Page II-18, Table 4-2

COMMENT SUMMARY: Since the parameters are metals, reference to "soil gas" in the heading should be deleted and the concentrations expressed in mg/kg.

Response:

The table heading and units have been revised.

Comment 5, Page II-22, Section 4.3.4, Paragraph 1

COMMENT SUMMARY: This paragraph should note that the persistence discussion assumes that no remedial measures are taken.

Response:

The text has been revised to address the comment.

Comment 6, Page II-23, Paragraph 5

COMMENT SUMMARY: Replace "the" with "this" in the sentence.

Response:

The text has been revised.

Comment 7, Page II-25, Paragraph 5

COMMENT SUMMARY: Add discussion of need to continue to monitor soil gas and possibly remediate later under OU B remedial actions.

Response:

The text has been revised to address the comment.

Comment 8, Page II-30, Table 5-2

COMMENT SUMMARY: Change the work "Scope" to "Slope"

Response:

The text has been revised.

Comment 9, Page II-36, Fifth Bullet

COMMENT SUMMARY: Add a remedial action objective to continue to monitor soil gas and include potential future remediation of VOCs in the OU B ROD.

Response:

The requested remedial action objective was added.

Comment 10, Page II-38, Second Column

COMMENT SUMMARY: Applying the same 10 mg/kg cleanup levels for PCBs for the DRMO lot to the stream sediments may not be acceptable due to ecological considerations. Five times background may not be an appropriate cleanup level, especially if no detectable levels of a constituent are seen in background.

Response:

Text has been revised. "Five times background" cleanup level has been deleted.

Comment 11, Page II-41, Section 6.3

COMMENT SUMMARY: It should be clearly stated that the surface water monitoring program, cap monitoring program, drainage channel lining monitoring program, vadose zone monitoring plan and groundwater monitoring plan will be developed, must meet regulatory approval and be enforceable.

Response:

Text has been revised. Enforceable monitoring plan development has been added.

Comment 12, Page II-44, Table 6-4

COMMENT SUMMARY: This table should be deleted.

Response:

The table has been deleted.

Comment 13, Page II-46, Last Paragraph

COMMENT SUMMARY: Reference the Operation and Maintenance Plan and its schedule.

Response:

Preparation of an Operation and Maintenance Plan, describing monitoring requirements, prior to construction has been added to text.

Comment 14, Page II-46, Section 6.4.2

COMMENT SUMMARY: What areas will be covered by new cap? Will older paved areas be repaved and included in the O&M plan?

Response:

The text has been revised to state that all existing paving over soils exceeding cleanup standards will be brought up to the standards of newly capped areas and be included under the O&M plan.

Comment 15, Page II-46, Section 6.4.2

COMMENT SUMMARY: The 2" minimum asphaltic cap shown in Figure 6-3 differs in width from the 2.5" cap used for costing purposes.

Response:

Figure 6-3 has been revised to show a 2-2½" minimum cap thickness. The actual thickness of the cap will be specified during the cap design, based on thickness required to handle equipment loads. The 2½" thickness used in the costing is a reasonable estimate of the design.

Comment 16, Pages II-47 through II-49

COMMENT SUMMARY: Alternatives 3 and 4 should include language to indicate OU B1 would be repaved; costs for this paving should be included.

Response:

The description of these two alternatives does indicate that OU B1 would be repaved. The final Remedial Investigation/Feasibility Study (RI/FS) includes paving costs in the alternatives cost. The costs in the ROD have been revised to be consistent with the costs in the final RI/FS.

Comment 17, Page II-53, Paragraph 4

COMMENT SUMMARY: Explain the basis for this cost estimate and the volume of soil assumed to be remediated.

Response:

The costs have been revised to be consistent with the final RI/FS. The cost is based on excavating, transporting, and disposing of 4,400 cubic yards of "hot spot" soil. The final RI/FS provides more detail on the other assumptions that went into this cost estimate.

Comment 18, Page II-59, Item 3

COMMENT SUMMARY: Installation of a cap will not necessarily reduce volatile contaminants, e.g., freon 113 releases to air and groundwater to below measurable levels.

Response:

Vadose zone model results indicate Freon® 113 concentrations over 30 years would reach a maximum of 0.14 parts per billion by volume (ppbv) in near-surface soil gas and in groundwater, a maximum of 4.1 x 10^{-9} microgram per liter (μg/L); both of which is below current detection limits. Therefore, they would not be measurable.

Comment 19, Page II-59, Items 4 and 5

COMMENT SUMMARY: The ROD should state that monitoring plans will be developed, must meet agency approval, and be enforceable.

Response:

The text has been revised to reflect the comments.

Comment 20, Figure 8-1

COMMENT SUMMARY: This figure should address ecological considerations for remediation of soils and sediments.

Response:

The figure has been revised to address ecological considerations for sediments. The contaminated soils will be capped on the basis of health risk or Applicable or Relevant and Appropriate Requirements (ARARs). There are no comparable ecological criteria for soils.

Comment 21, Page II-61

COMMENT SUMMARY: More discussion is required on how the chosen alternative meets all the ARARs on Page II-38 and those ARARs referenced in the 11 March 1993 letter from the RWQCB.

Response:

Section 8.2.2 has been revised to reflect all of the ARARs specified on Page II-38, as well as the ARARs referenced in the March 1993 letter from the RWQCB.

DEPARTMENT OF TOXIC SUBSTANCES CONTROL COMMENTS

Comment 1

COMMENT SUMMARY: Provide a description of how the OU B1 Interim ROD will be incorporated into the basewide ROD.

Response:

A short description has been added to text in Part I, Page I-1, Section 2.0.

Comment 2

COMMENT SUMMARY: Install a sediment trap in the drainage ditch leaving the DRMO yard.

Response:

Text has been added to the remedy description section (Section 8.1, bullet 2) to require the installation of a sediment tray.

Comment 3

COMMENT SUMMARY: Since 10 ppm is the cleanup level for PCBs, institutional controls are needed to ensure the usage of the site remains industrial.

Response:

Text has been added to Section 8.2.2 to state that institutional controls will be added for OU B1.

Specific Comment 1, Page I-1, Section 2.0, Line 1

COMMENT SUMMARY: Add the word interim before "remedial action...".

Response:

The text has been revised in accordance with the comment.

Specific Comment 2, Page I-2, Section 4.0

COMMENT SUMMARY: Add the consolidation of soils from nearby areas onto B1 to the description of the remedy.

Response:

Step 2 of Section 4 has been revised to add the consolidation of soils from other areas.

Specific Comment 3, Page I-2, Section 5.3

COMMENT SUMMARY: This section should state that the entire DRMO lot will be capped.

Response:

The text has been revised in accordance with the comment.

Specific Comment 4, Page I-2, Section 5.4, Paragraph 2

COMMENT SUMMARY: The statement should be changed to read "...remedial action, and no more than five years thereafter."

Response:

The text has been revised in accordance with the comment.

Specific Comment 5, Page I-3, Signature Block

COMMENT SUMMARY: The signature block should be changed to name Anthony J. Landis.

Response:

The signature block has been revised in accordance with the comment.

Specific Comment 6, Page II-8, Section 3.0, Paragraph 3

COMMENT SUMMARY: Revise the text to reflect the availability of the public meeting transcript in the Administrative Record.

Response:

The text has been revised in accordance with the comment.

Specific Comment 7, Page II-11, Section 4.2.1

COMMENT SUMMARY: Specify that the surface water samples were collected prior to the liner placement over the PCB "hot spots."

Response:

The text has been revised to reflect the comment.

Specific Comment 8, Page II-15, Section 4.2.4

COMMENT SUMMARY: The exclusion of background samples less than five times background from the risk assessment needs more explanation. A cleanup level of five times greater than background for a particular constituent may not be appropriate if these concentrations exceed 10^{-6} risk or a hazard index of 1.

Response:

Reference to five times background as a soil cleanup criterion has been deleted from the text.

Specific Comment 9, Page II-16, Section 4.3.1, Paragraph 3

COMMENT SUMMARY: The first two sentences require editing.

Response:

These two sentences have been edited.

Specific Comment 10, Page II-32, Section 5.2

COMMENT SUMMARY: More discussion is required of the ecological resources in the drainage ditches leading off of OU B1.

Response:

Text has been added to address burrowing owl habitat in drainage ditches.

Specific Comment 11, Page II-36, Table 6-1

COMMENT SUMMARY: The remedial action objectives should indicate that volatile organic compound contamination will be addressed in the OU B ROD.

Response:

This objective has been added to the table.

Specific Comment 12, Page II-38, Section 6.1.1

COMMENT SUMMARY: Clarify last sentence that supports Figure 6-2. Use an inorganic cleanup level that is the more conservative of 10^{-6} risk, a hazard index (HI) of less than one, or five times background.

Response:

Per agreement at an agency meeting, the text has been changed to specify a cleanup level for inorganics of either 10^{-6} risk, HI index of less than one, or background concentrations.

Specific Comment 13, Page II-40, Figure 6-2

COMMENT SUMMARY: Add a pathway to the figure for determining if the HI exceeds 1.

Response:

The HI criterion has been added to the figure.

Specific Comment 14, Page II-52, Column 2, Paragraph 3

COMMENT SUMMARY: Explain that the additional costs to perform the pilot studies will increase the cost of this alternative.

Response:

The text has been revised in accordance with the comment.

Specific Comment 15, Page II-52, Section 6.4.7

COMMENT SUMMARY: Add more discussion on the applicability of LDRs to each alternative. Don't consider disposal alternatives if LDRs are applicable to them.

Response:

The text has been expanded to include additional discussion of LDRs. All disposal alternatives have been retained because if LDRs apply, the soils can still be treated (e.g., solidified) at the landfill. This would increase costs, but the alternative would be implementable. The only exception is the incineration treatment standard for RCRA soils with halogenated organic compound concentrations exceeding 1,000 $\mu g/kg$. However, since soils to be excavated for disposal are not considered RCRA soils, the disposal alternatives are retained.

Specific Comment 16, Page II-57, Table 1

COMMENT SUMMARY: Make this table consistent with the Cost Sensitivity table in the RI/FS report.

Response:

The table has been revised to be consistent with the final RI/FS Report.

Specific Comment 17, Page II-60, Figure 8.1

COMMENT SUMMARY: Include a box in the soils column that allows for consolidation of contaminated soils.

Response:

The figure has been revised to make this addition.

U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS

Comment 1, Page 1-2

COMMENT SUMMARY: Clarify how including a treatment technology evaluation in the remedy demonstrates the intent to satisfy regulatory preference for treatment. Also, use the word "initiation" instead of "commencement."

Response:

A brief discussion has been added to address the intent of the remedy. The term "commencement" has been replaced.

Comment 2, Page 1-3

COMMENT SUMMARY: Change the EPA signatory block to John Wise, Acting RA.

Response:

The signature block has been revised.

Comment 3, Page II-27

COMMENT SUMMARY: The continued industrial use of McClellan AFB is not guaranteed, particularly considering the potential for base closure. Also, clarify whether the exposure assessment for potential residential use included the construction of the residential use setting.

Response:

The use of institutional controls to assure "industrial-only use" of OU B1 has been added to Chapter I, Section 4.0 and Chapter II, Section 8.2. Health risk potential during residential construction is insignificant relative to long-term residential health risk.

Comment 4, Page II-28

COMMENT SUMMARY: Explain the significance of the 30 years in defining a timeframe for releases to groundwater. Also, define the term "measurable" concentration and why any constituents should be allowed to reach groundwater.

Response:

Text has been added to address the issues raised.

Comment 5, Page II-34

COMMENT SUMMARY: Include a discussion of the impacts on ecological resources from the remedial action. Also discuss this issue for the No Action Alternative.

Response:

Text has been added explaining potential ecological impacts.

Comment 6, Page II-35

COMMENT SUMMARY: Continued DRMO operation should be reflected in the implementability criteria evaluation, not as a remedial action objective.

Response:

The text has been revised in accordance with the comment.

Comment 7, Page II-38

COMMENT SUMMARY: A remedial action should both reduce risk to acceptable levels and meet ARARs. Clearly specify whether each requirement is an ARAR or a TBC. Also, provide more detail on how cleanup levels from other Superfund sites were applied to selecting the OU B1 cleanup level for dioxin.

Response:

The text has been changed in accordance with the comment. Requirements are individually specified in ARARs or TBCs.

Comment 8, Page II-46

COMMENT SUMMARY: Revise the text in the No Action Alternative discussion to stress that ARARs are not met and no protection is achieved.

Response:

The text has been changed in accordance with the comment.

Comment 9, Page II-49

COMMENT SUMMARY: Permits would not be required for the excavation and transport of dioxin-containing soil because these are on-site actions.

Response:

The text for this alternative, as well as for the other off-site alternatives, has been revised to eliminate the reference to excavation permits.

Comment 10, Page II-50

COMMENT SUMMARY: Because the incineration of dioxin-containing soils would be on site, no permits would be required.

Response:

The text has been revised in accordance with the comment.

Comment 11, Page II-54

COMMENT SUMMARY: The ARAR compliance discussion should be expanded to include all ARARs. The discussion of ARARs for off-site alternatives should be separated out. The SMAQMD Rules 453 and 543 should be discussed in more detail.

Response:

The text in Subsection 7.2 has been expanded to include discussion of key ARARs, including SMAQMD Rule 453. Text explaining the difference between ARARs for on- and off-site actions has been added and retained in this subsection since it appears to be most relevant here.

Comment 12, Page II-56

COMMENT SUMMARY: Clarify the need for permits.

Response:

The text has been revised to reflect the comment. While permitting is not required at a CERCLA site, obtaining approvals for off-site actions (such as transport and treatment/disposal) will impede implementation of disposal alternatives.

Comment 13, Page II-58

COMMENT SUMMARY: Revise the comparative evaluation conclusions to reflect any changes made earlier to the need for permits and LDR complications.

Response:

An additional bullet on LDRs has been added to the text.

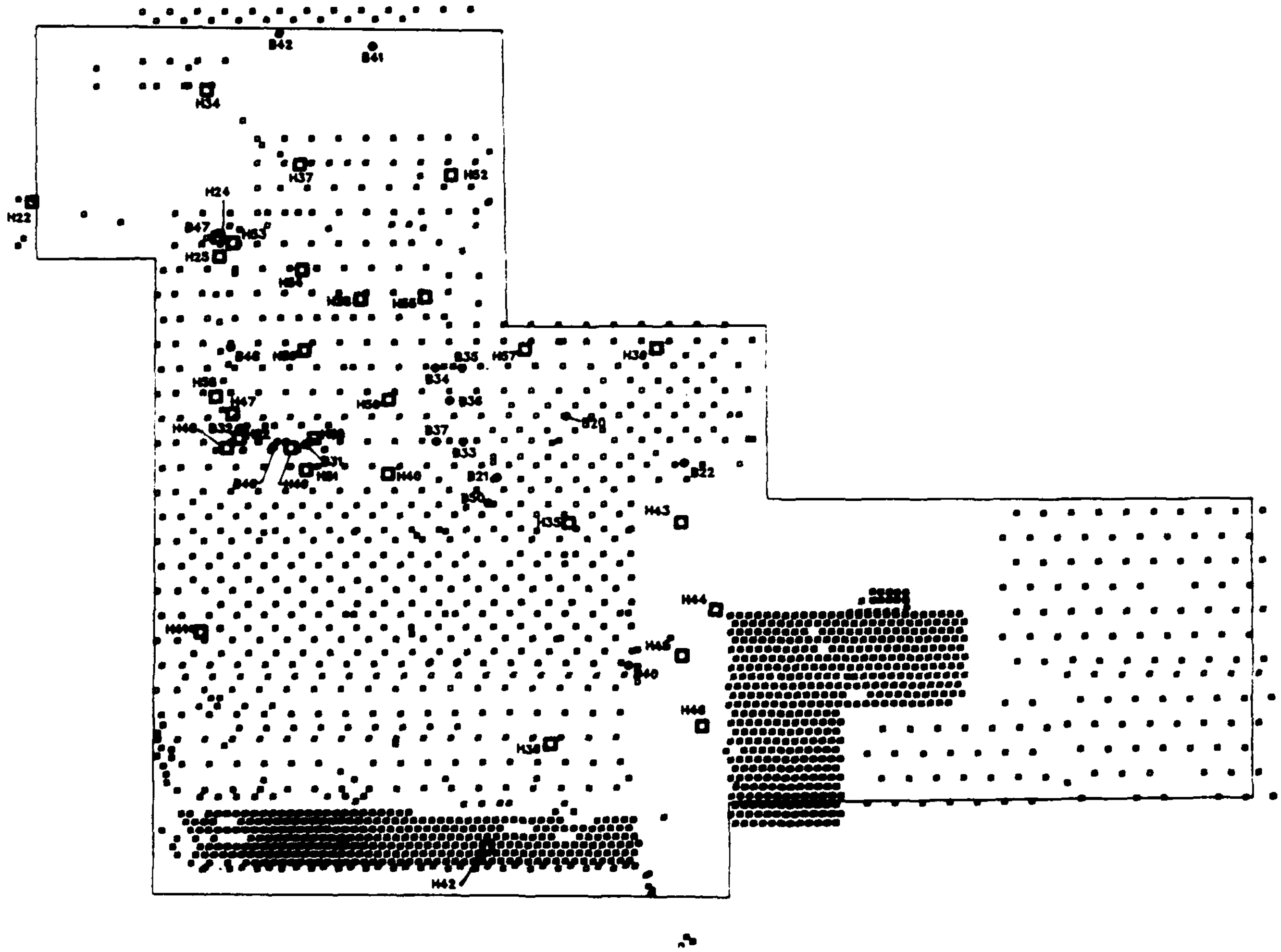
Comment 14, Page II-61

COMMENT SUMMARY: Substantiate that the site will remain industrial. Also, provide more discussion on the use of "precedent" to establish dioxin cleanup levels.

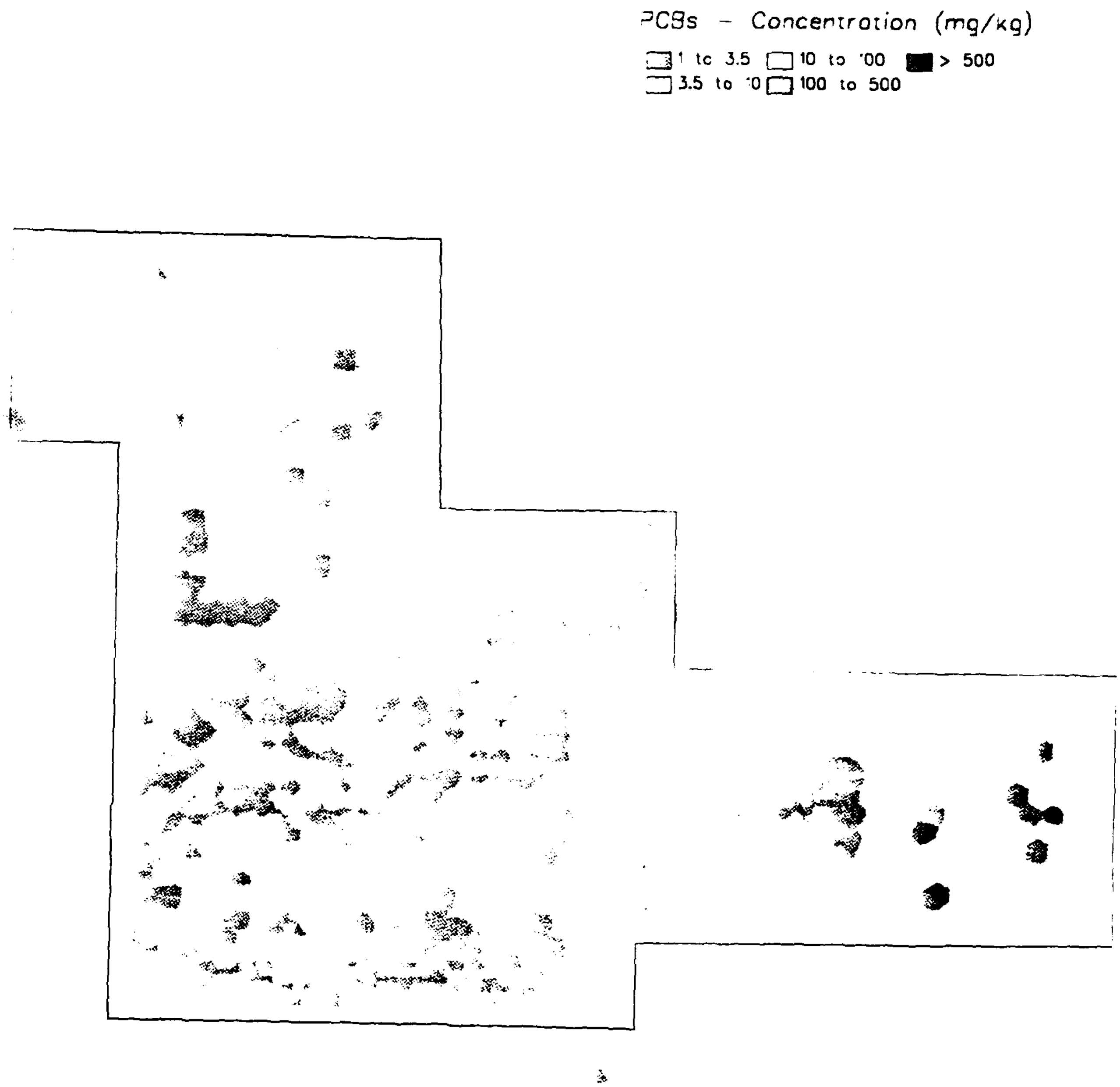
Response:

Description of institutional controls to assure industrial use has been added to the text, while additional text has also been added to explain the use of precedent for dioxin cleanup levels.

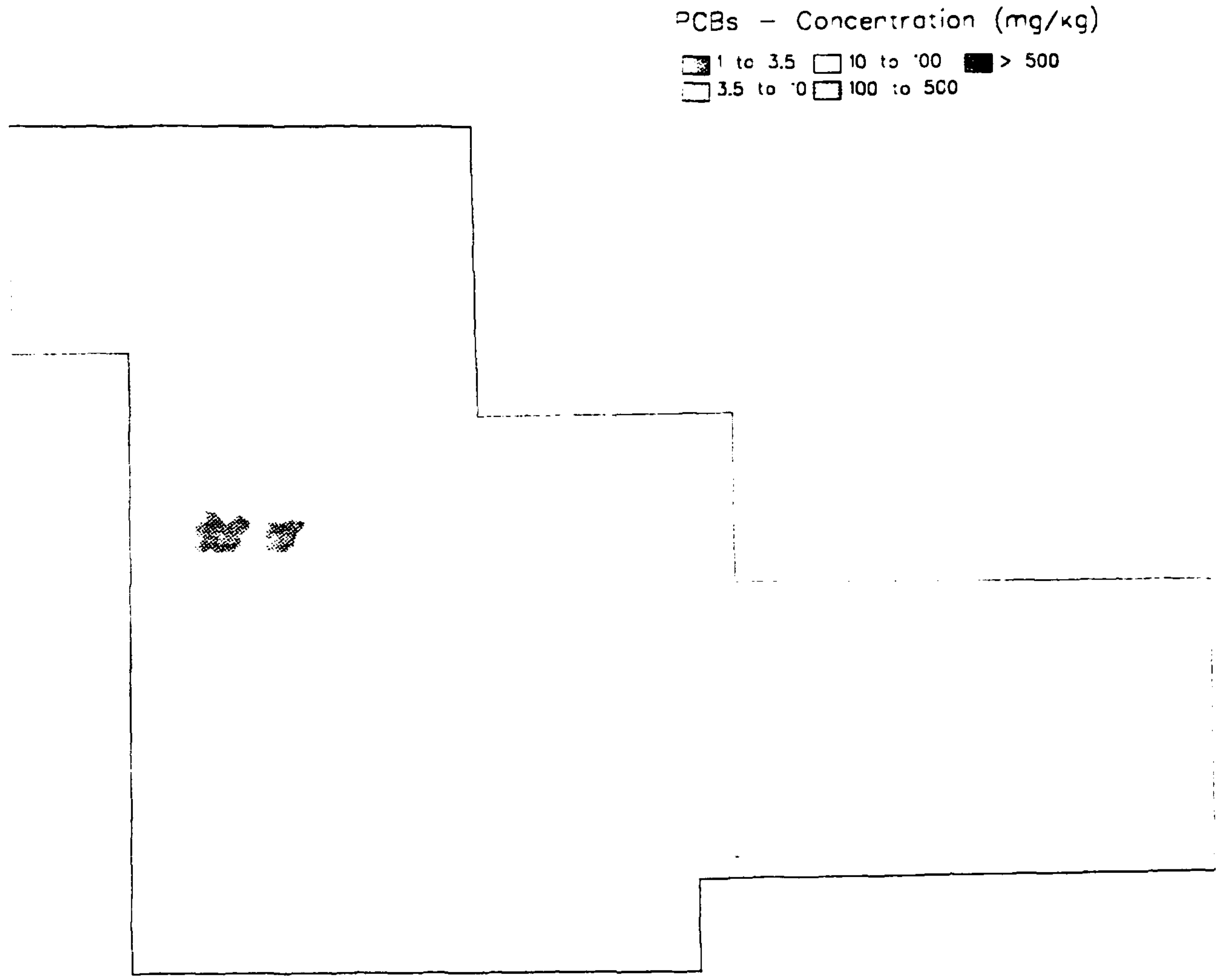
OVERLAYS



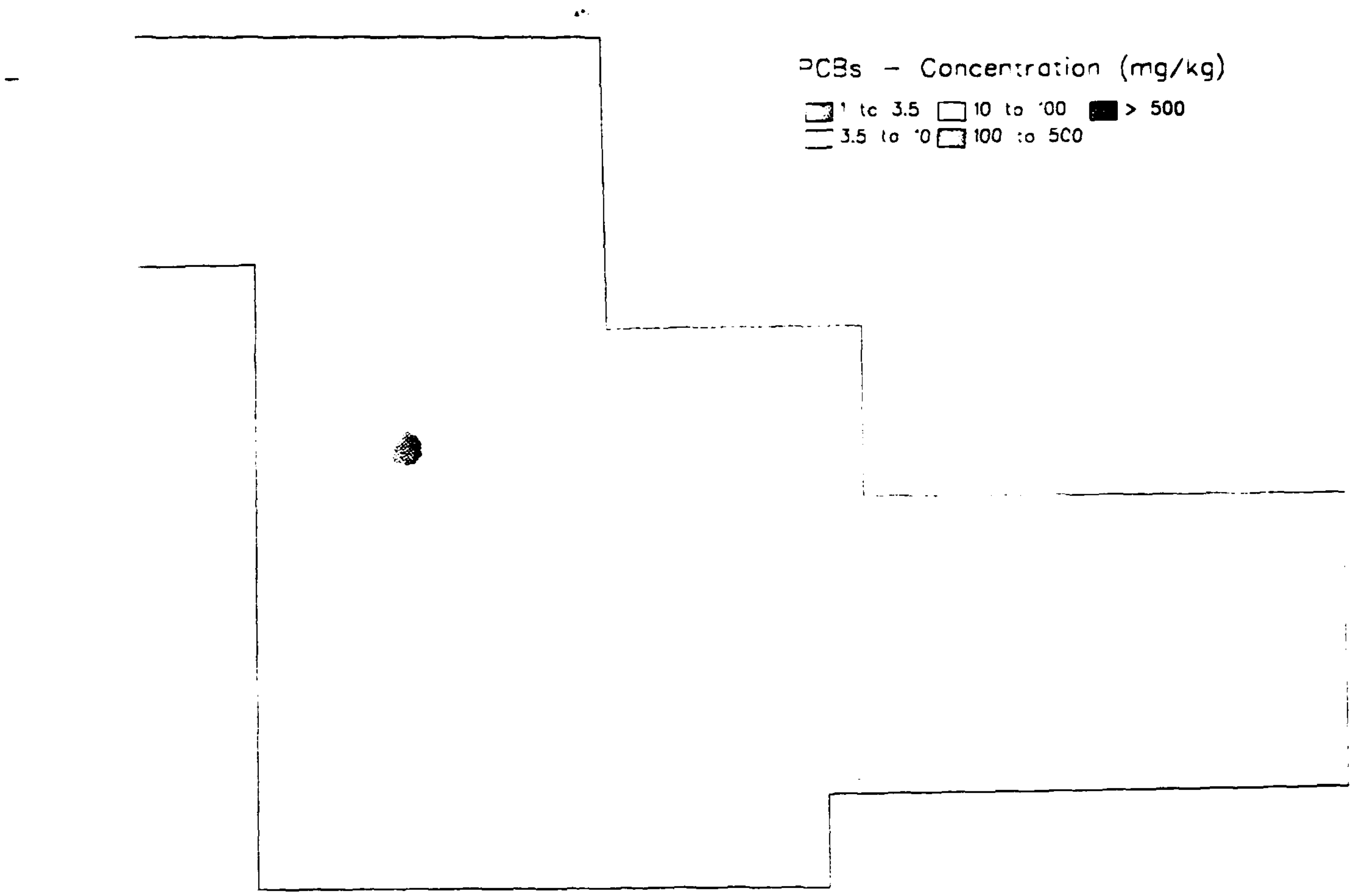
Overlay A. Sampling Locations at OU B1



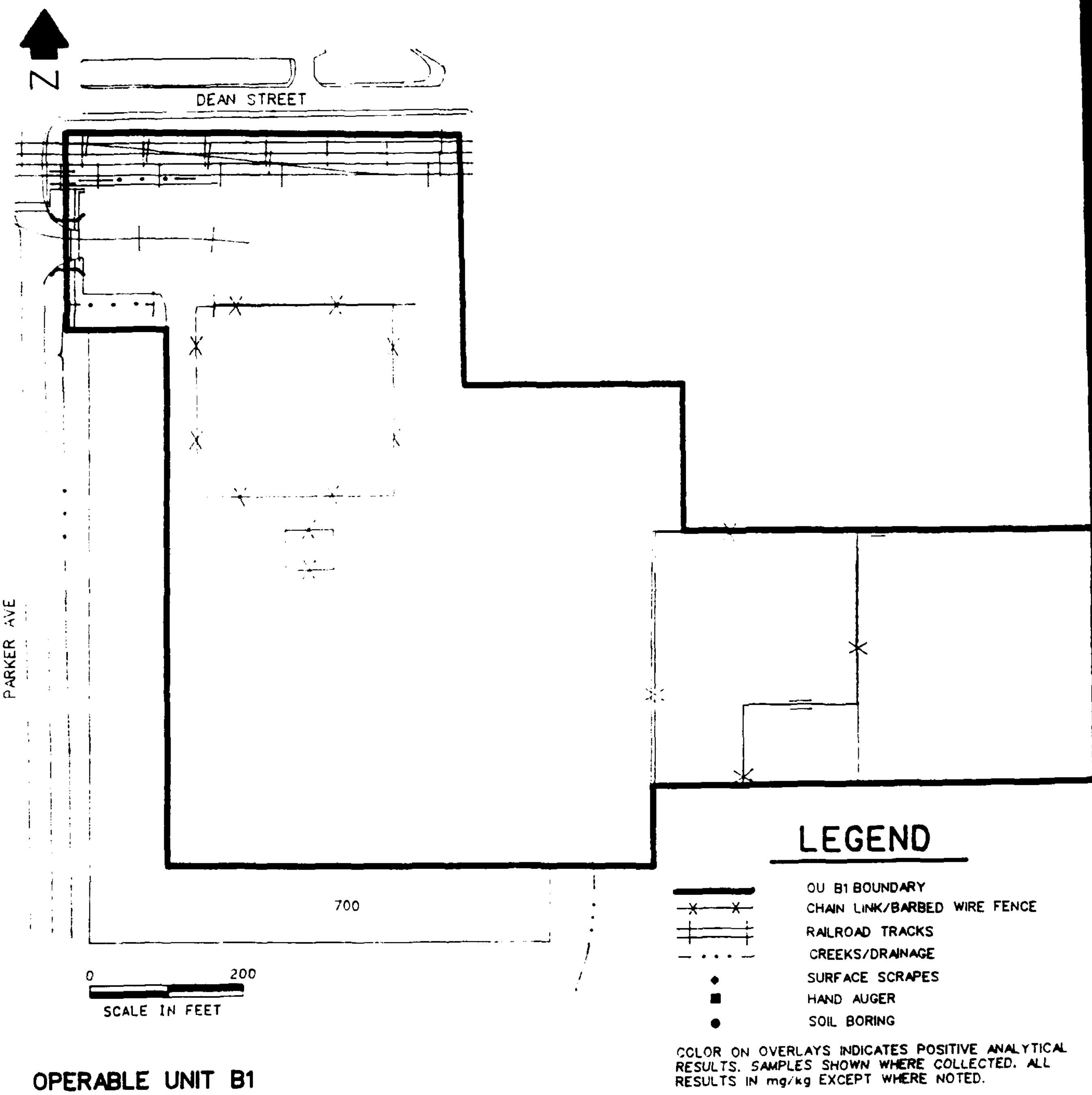
Overlay B. Arochlor 1260 (PCB) Concentrations in Surface Soil



**Overlay C. Arochlor 1260 (PCB) Concentrations in Soil
1 to 3 feet BGS**



Overlay D. Arochlor 1260 (PCB) Concentrations in Soil 3 to 6 feet BGS



OPERABLE UNIT B1

OUBRIB OUB1MAP SAC

OVERLAYS TO THE OU B1 BASE MAP

Overlay A. Sampling Locations at OU B1

Overlay B. Arochlor 1260 (PCB) Concentrations in Surface Soil

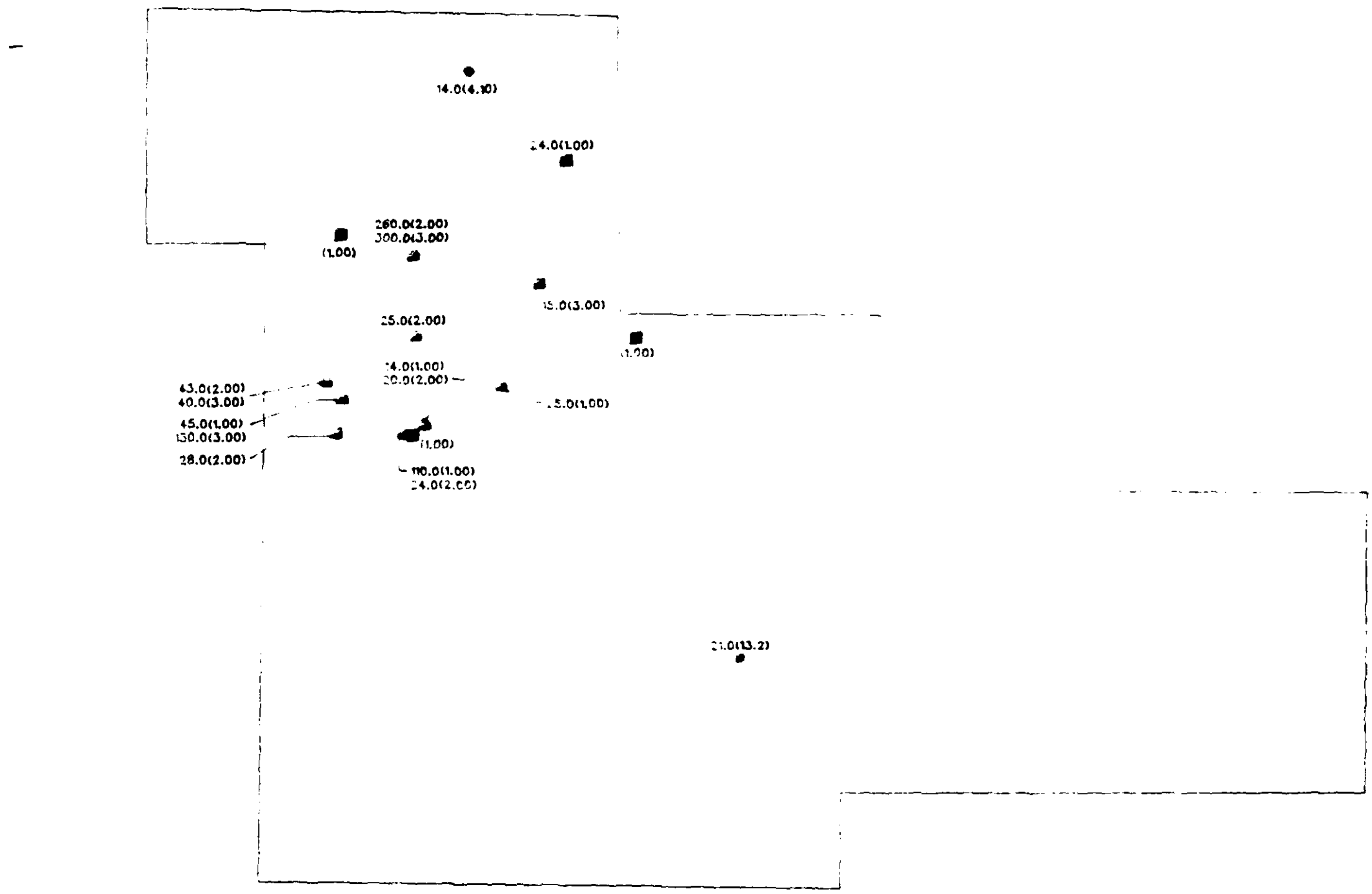
Overlay C. Arochlor 1260 (PCB) Concentrations in Soil 1 to 3 feet BGS

Overlay D. Arochlor 1260 (PCB) Concentrations in Soil 3 to 6 feet BGS

Overlay E. Dioxin/furan Concentrations in Surface Soil

Overlay F. Extractable TPH Concentrations in Surface Soil

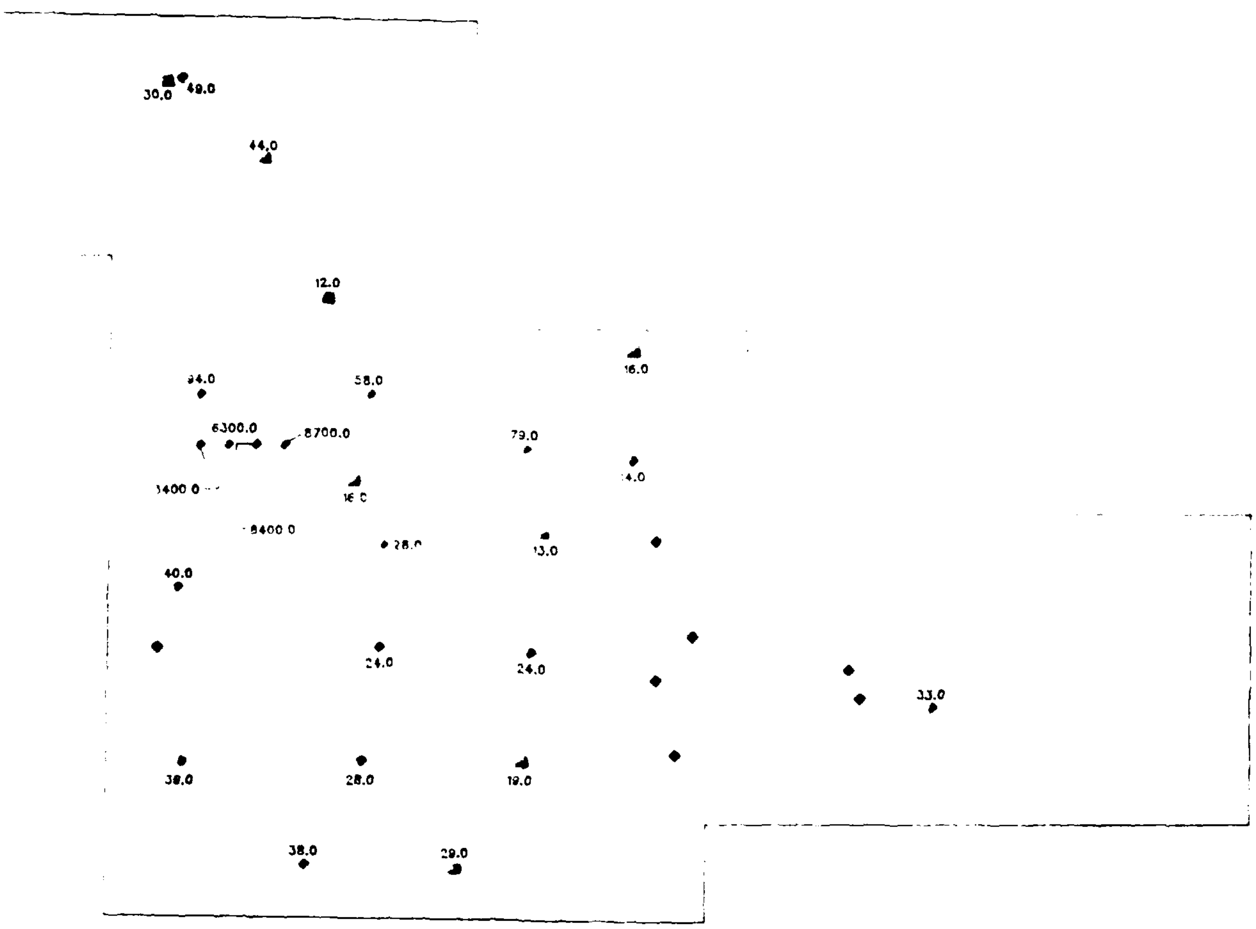
Overlay G. Extractable TPH Concentrations in Soils Greater than 1 foot BGS



Overlay G. Extractable TPH Concentrations in Soils Greater than 1 foot BGS

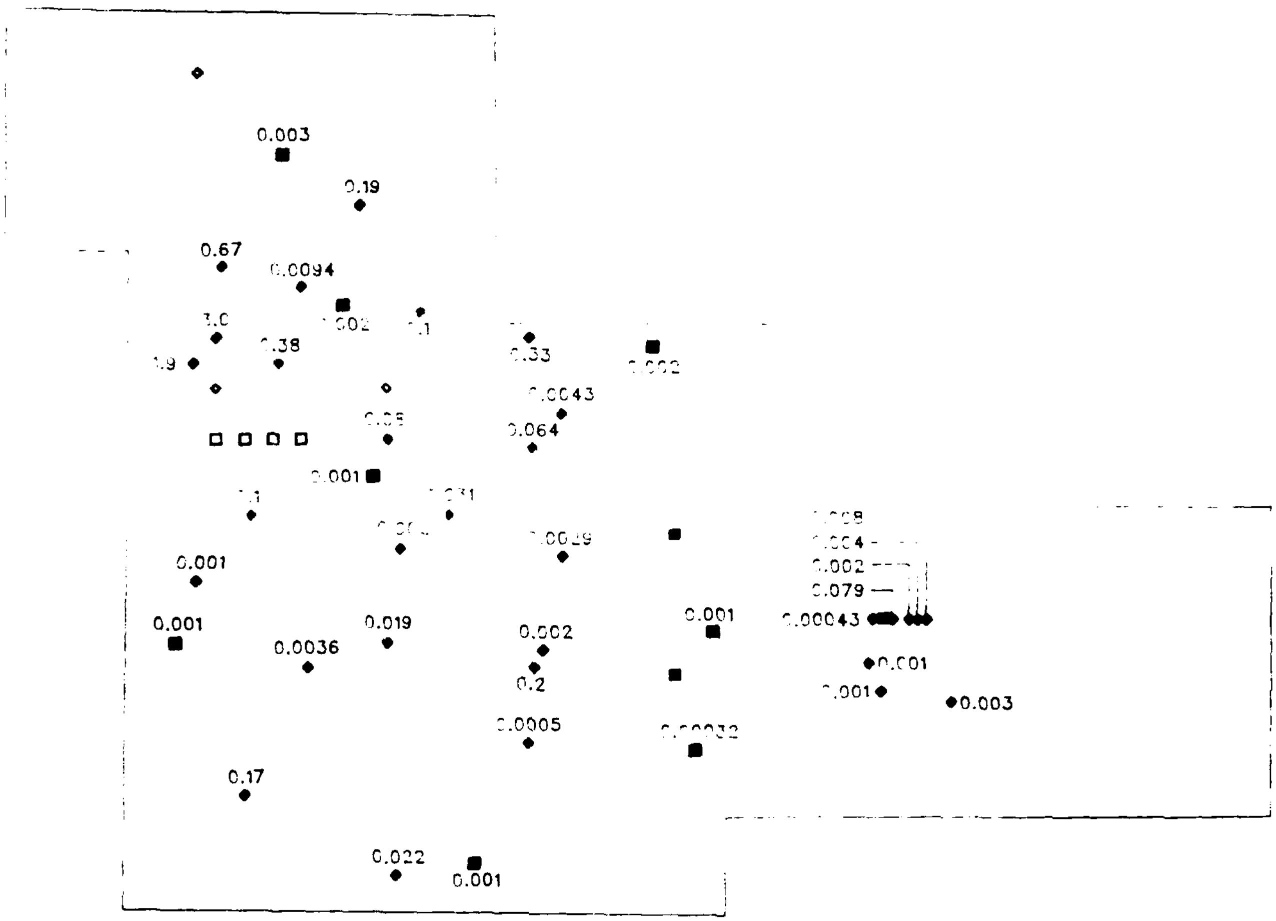
(1.00) DEPTH OF SAMPLE

OUBRIFS OUB1TPHA SAC



Overlay F. Extractable TPH Concentrations in Surface Soil

OUBRIFS OUB1TPH SAC



□ CONCENTRATIONS AT THE LOCATIONS COULD NOT BE QUANTIFIED DUE TO PCB INTERFERENCE

0.003 (1-TEF) IN ppb

◆ TCDDeq NOT CALCULATED: ANALYTICAL RESULTS FOR CONGENER CLASSES ONLY

Overlay E. Dioxin/furan Concentrations in Surface Soil